November 15, 1934

Engineering News-Record

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Highways

A Review of Concrete Roadbuilding Practice

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Welded Joints Studied with New Polariscope

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Taking Topography on a 300-ft. Cliff

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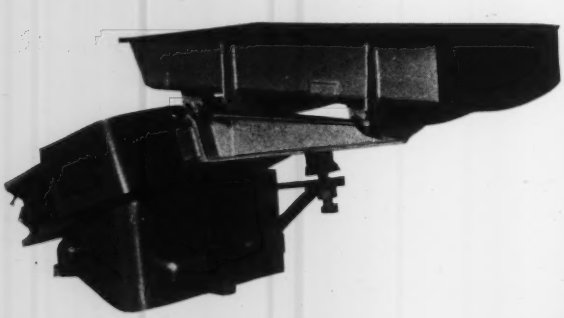

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Tomorrow's Markets

IN THE course of a recent discussion of current industrial trends, a successful industrial manufacturer summed up his company's policy in this striking fashion: "If in two years we have not obsoleted our current products we shall feel that we have been asleep." And let it be said here that the record of this particular company is ample evidence that his statement was no rhetorical flourish.

This example is not offered as one to be followed literally by any considerable number of industrial producers. The company happens to operate in a relatively new field which still offers broad latitude for pioneering in both practice and products.

Yet we dare not evade on this ground the far-reaching implication of this declaration. Today every manufacturer of industrial goods and equipment is subject in some degree to the conditions that are so dominant in shaping the policies of this particular concern.

The market for all capital plant and equipment, whether it be machine tools, power shovels, electric generators or office buildings, depends in general on two factors. One is the rate of national expansion, the other is the rate of depreciation.

The first determines the demand for additional facilities of production and service required by a growing population; i.e., more and more of the *same kind* of plant to supply goods and services to *more* people.

The second determines the demand for new facilities to replace those that have worn out or have outlived their effective life because of obsolescence. Original durability and severity of usage determine deterioration. But obsolescence is measured by the availability of a new product, so much more speedy, more convenient, more productive, more efficient or otherwise more desirable as to justify writing off the old and installing the new.

Just now, whatever may be the demand for additional facilities during the next ten years, it seems safe to assume that replacement will play a more important rôle than it ever has done in the development of markets for capital products.

If it be true that we may expect a reduction in the rate of national growth, it follows that we can maintain a broader consumption of goods and services and a rising standard of living only through more efficient, cost-reducing production. This means the continuous improvement of that vast equipment required to generate and apply the power by which man multiplies his productive energies. And this is the peculiar responsibility of the technician, the engineer and the manufacturer who conceive, design and build that equipment.

All this poses for the producer of industrial equipment certain searching questions. Here are just a few of them:

> Shall he design and build his product for long life or rather for high productivity and efficiency, reasonable maintenance and a selling price that will permit economical replacement with the advent of a more productive unit?
>
> Is there danger of his counting so heavily on the operating efficiency of mass-production methods that over-standardized shop practice will tend to resist improvement of the product? In this case, is there danger that less hidebound competitors may attend to the obsoleting rather than the producer himself and thereby leave him with an efficient production set-up but no market?
>
> Should the manufacturers of like products unite to obstruct change by measures designed to restrain improvement? If they do, what might the procedure eventually cost them through the rise of price-alone competition and the opening of the market to wholly new methods and processes that might obsolete the very product itself?
>
> If the market is to be kept virile and productive for him, how closely must the manufacturer keep it informed as to the economies and other benefits his improved materials or equipment make available to his customer?
>
> In general, can the manufacturer expect larger volume, higher profits and greater stability through selling more of the *same* worthy product to *new* customers or by selling *new* and worthier products to the *same* customers?

These are vital questions; they cannot be answered in generalities. But they must be met courageously and answered honestly by each manufacturer of capital goods and equipment if he is to hold his place during the period just ahead of us.

Willard Chevalier

ENGINEERING NEWS-RECORD

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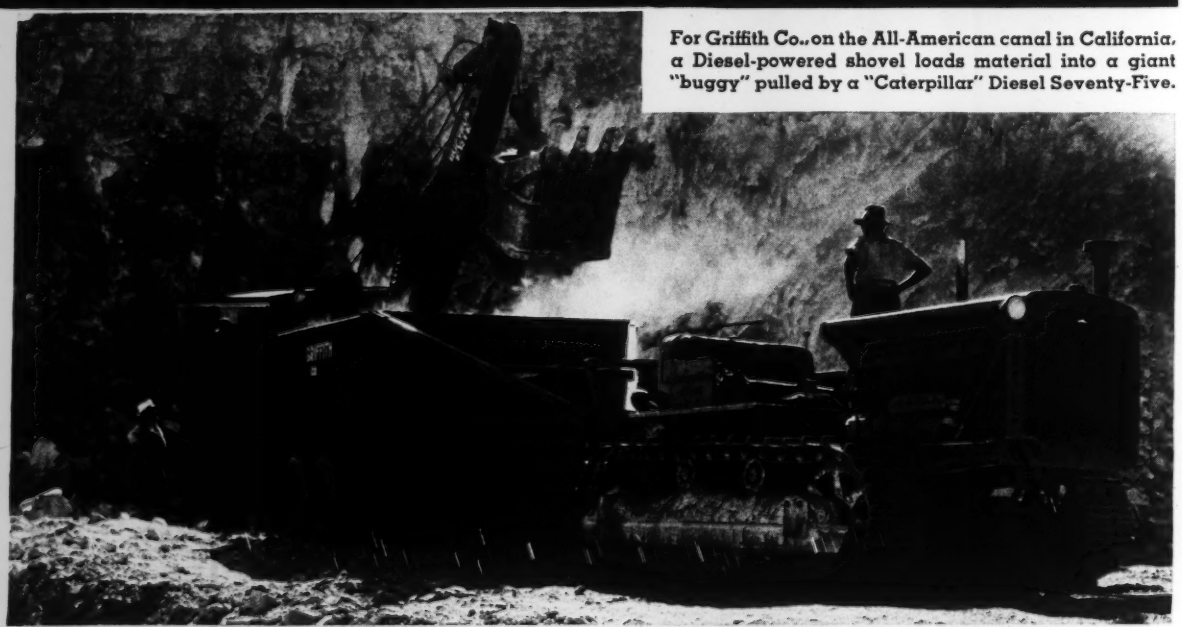
—SAY LUEBKEMAN BROTHERS, OF BUENA PARK, CALIFORNIA, WHOSE FUEL COST FOR THE DIESEL IS LESS THAN ONE-FIFTH THAT OF AN EQUAL-POWERED GASOLINE TRACTOR.

OWNERS are enthusiastic over their Diesel economies in power costs—enthusiastic, too, about other "Caterpillar" features. Luebkeman Brothers write: "The 'Caterpillar' Diesel burns all the fuel, runs evenly when it idles, accelerates fast, lugs better than anything we have ever seen." Ask for the full story of "Caterpillar" Diesel Tractors and Power Units. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

A. J. Schrader, of Scranton, Pa., uses "Caterpillar" Diesel power to remove the overburden for coal stripping operations.

AMERICA GOES DIESEL · AMERICA GOES DIESEL



For Griffith Co., on the All-American canal in California, a Diesel-powered shovel loads material into a giant "buggy" pulled by a "Caterpillar" Diesel Seventy-Five.

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In the News:

COLORADO VOTERS adopted a constitutional amendment preventing gas-tax diversion at an election Nov. 10.

BY A VOTE OF 16 TO 1 the citizens of Memphis, Tenn., voted $9,000,000 in bonds to provide a distribution system to utilize TVA power.

THE STOCK PHRASE in many a contract form relating to "war, invasion or insurrection" acquired real meaning last week for the contractor of the Parker Dam on the Colorado River. Governor Moeur, of Arizona, declared martial law on the east end of the dam site and threatened to send state troops to repel "invasion" by the construction workers. Arizona has never liked the idea of a dam at Parker, which would divert water to southern California.

A SIGNIFICANT MOVE toward unemployment insurance and old-age pensions, was inaugurated last week by President Roosevelt when he appointed an advisory committee of twenty business, labor and social welfare leaders, headed by Frank P. Graham, president of the University of North Carolina, to give advice and counsel.

LONDON is planning a clean-up of the south or Surrey bank of the Thames, to remove the ugly buildings and old wharves between Westminster and Waterloo Bridges, replacing them with a tree-shaded embankment similar to that along the north shore. Some $7,000,000 has been voted for the work by the London County Council, whose monumental new building is on the south bank.

ABANDONMENT of about 500 miles of railroad track in Kansas is causing fiscal difficulties in some twenty counties of the state. Removal of $7,500,000 from the tax rolls creates a sizable cut in revenues.

AFTER MONTHS of negotiations Denver has concluded an agreement with the PWA for a $3,500,000 loan and grant to construct a water supply project which involves bringing a flow from the Fraser River through the pioneer bore of the Moffat tunnel.

In This Issue:

AMONG THE NEW CROP of federal buildings being built in many of the larger cities, the Pittsburgh post office and federal courts building stands out as of exceptional structural interest. Three different column arrangements are required, to serve the railroads within the building, the post office facilities above and the court room on top. The building contains the first and largest group of tee-flange girders yet utilized.

THE FIRST PILE BRIDGE or trestle is said to have been built at York, Me., in 1761. Although extensively repaired during the past 170 years, this historic structure was still in service this time last year. Now it is replaced by a new timber bridge that is a recreation of the original Sewall's Bridge in every detail possible.

ANALYSIS OF THE GAS produced by digestion of sludge at the Toledo sewage-disposal plant is presented, and the conclusion is drawn that it would develop 2,000,000 kw.-hr. per year to operate the pumping plant at the station.

FOLLOWING UP the question-and-answer review of progress in the field of highway foundations published last week, a résumé is presented of the development in present concrete-road-design practice.

A NEW TYPE OF POLARISCOPE, which has been developed at Columbia University, uses a reflector behind the model being studied, to pass the light back through the polarizer-analyzer system.

ANOTHER INSTALLMENT ON "Advice for Contractors Entering Government Work" points out the unusual degree of responsibility assumed by those accepting contracts in assuring themselves of the physical conditions to be encountered.

IN HOLLAND a five-year study has been made on the silt movement at the mouth of the Maas River at Rotterdam harbor, to determine the effect of the intermingling of fresh and sea waters. The results present valuable data on flocculations, suspension and settlement which could be used to effect better channel control.

WITH MORE than half of the Boulder Dam penstocks fabricated, it is possible to review the details of the welding and X-raying procedure. An article describes the steps from the arrival of steel plates at the plant to the X-ray-examined and stress-relieved complete pipe sections.

TOPOGRAPHIC SURVEYS of steep cliffs present difficult problems in field work. A novel method is described which uses a target manipulated by ropes to eliminate the usual hazardous procedure of having men in slings hold the targets.

Coming Articles:

KNOWLEDGE of cement and concrete has been expanded in scope and amplified in important detail through two outstanding research programs. The Bureau of Reclamation has completed a three-year study of mass-concrete problems from the analysis of the cement to the artificial cooling of the resulting concrete. Concurrently, the Portland Cement Association has been conducting a vigorous investigation on the effects of compound composition on the resulting properties of cement. Much of the detail in these studies falls distinctly in the field of chemistry or cement technology and is beyond the direct interest of most engineers, but the important results obtained and conclusions reached contain vital information to every designer or constructor. Comprehensive reviews of these two investigations will appear in next week's issue.

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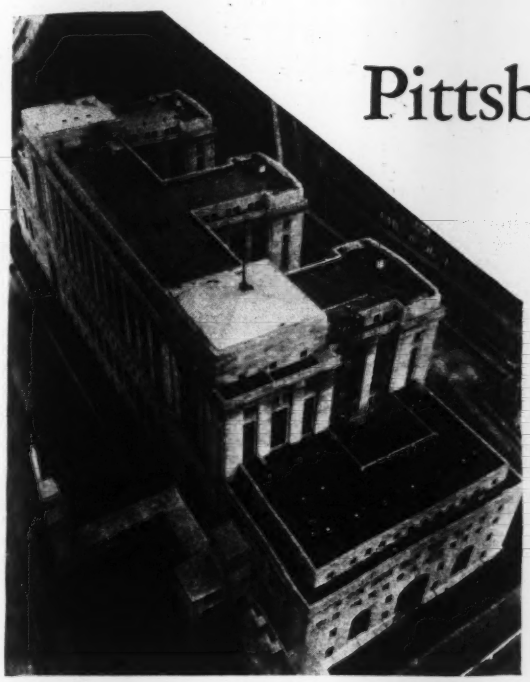


Pittsburgh Post Office and Federal Building

In its dual role of providing post-office facilities in the lower portion and federal offices and court rooms in the upper portion, this building involved unusual design features, including complicated framing, the application of a new girder form and isolation of railroad tracks by means of a cork blanket

By Paul F. Pape
Weiskopf & Pickworth, Consulting Engineers, New York, N. Y.

FIG. 1—LOOKING NORTH toward P.R.R. station.

THE NEW ten-story post-office and federal building located in the downtown section of Pittsburgh, Pa., presented structural problems that are of interest because of their unusual nature. The most important are: (1) a number of cramped girder designs for column transfers; (2) applications of a new girder form for long-span ramp girders, and for column transfer and railroad girders; and (3) the isolation, by means of a cork blanket, of more than 2,000 ft. of railroad track from the building frame that supports it.

The building site and location are very adaptable for a post office. The site (Fig. 2), having a frontage of 532 ft. along Grant St. and extending back 146 ft. along Seventh Ave. at one end and 197 ft. at the other, provides spacious floors for a straight-line arrangement of mail-handling equipment and for grouping the closely related departments of the postal system, making for ease and speed in the handling and distribution of mail. The building is connected to the Pennsylvania Railroad passenger station by trucking and conveyor tunnels, and to the Pennsylvania main-line tracks that run behind it by four spur tracks. In addition to these distributing mediums, a north ramp and an east ramp are provided so that mail trucks can reach the basement loading level and the second-floor loading platform respectively.

The building is of monumental character with its lines emboldened by deep reveals and setbacks. In harmony with this, the exterior walls are faced with limestone. A pavilion at each end in the front and open courts in the rear emphasize the symmetry of the structure.

General framing provisions

Of skeleton steel-frame construction, the building comprises ten stories above grade and three below at its deepest part. Mezzanine floors occur in portions of the sub-basement, basement, first and second stories. Setbacks in the building face were made at the fifth- and tenth-floor levels. Where the fifth-floor setbacks occur, at each end of the building, provision has been made for the future addition of five stories of the same height and architectural treatment as the center portion of the building between the pavilions. A total of 14,700 tons of structural steel was required for the building. The track level, first and fourth floors ran heavier in tonnage, in respective order, than the other floors.

In considering the floor-framing arrangement in the upper and lower portions of the building, the requirements of occupancy were an influence. The upper floors, used by all departments of the federal government, consist largely of outside offices with central communicating corridors between them. Since it was desirable that these corridors have high ceilings, the floor beams were framed in a north-south direction and made as shallow as possible. In addition to offices, the upper floors accommodate five court rooms and provide for an additional one in the future. These court rooms are in the rear of the building and have a height of two stories and an unobstructed area of about 44x50 ft. The interior columns were rearranged necessarily in making provision for these rooms.

The floors may be considered in groups of similarity—the seventh, eighth and ninth being in one group, the fourth, fifth and sixth in the second, and the first, second and third floors in another. The latter group was used by the post-office department and required provision for freight elevators, spiral chutes, slides, conveying and handling machinery, observation galleries, supply and stock rooms, etc. The track-level floor with its track construction, convey-

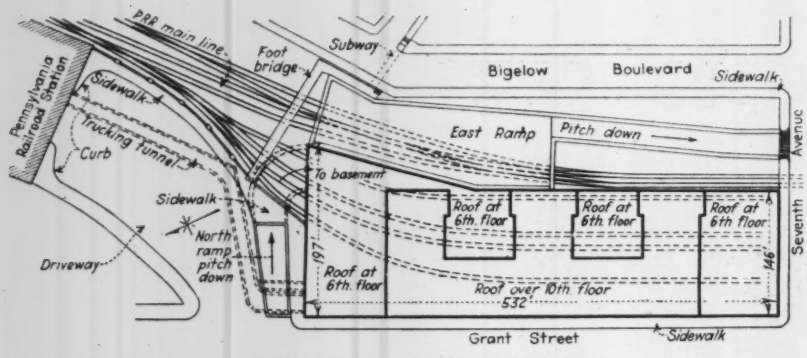


FIG. 2—PLOT PLAN of Pittsburgh post office and federal building. Four tracks on level below street are carried on building frame over the trucking basement reached by the north ramp.

ing machinery and trucking platforms also required special treatment.

The general framing arrangement is given in Fig. 3, which shows part plans of the track level, first and ninth floors. The bays are symmetrically spaced about the building center line in a longitudinal direction. The typical framing panels for the floor beams and girders consist of beams placed parallel to the front of the building and connected to single or double girders framed between columns in an east-west direction. The floor arches were designed for live loads of 80 to 300 lb. per sq.ft. in such areas as required. The typical floor areas, designed for a live load of 120 lb. per sq.ft., consist of a 1-in. cement finish, a 4½-in. gravel fill and a 4-in. gravel concrete slab reinforced with steel rods.

Because of the dual function of the building, different arrangements of columns were necessary at the track level and the first and fourth-floor levels. In the first to third stories a regularity of column spacing was required to meet the post-office requirements. In contrast to this regularity is a somewhat irregular spacing required above the fourth floor and the "crazy quilt pattern" of spacing required in the track-level story (to accommodate railroad, conveying and trucking facilities). Where gaps occurred between

FIG. 3—FLOOR PLANS at three different stories and a section across the building indicate how occupancy requirements affect the steel framing.

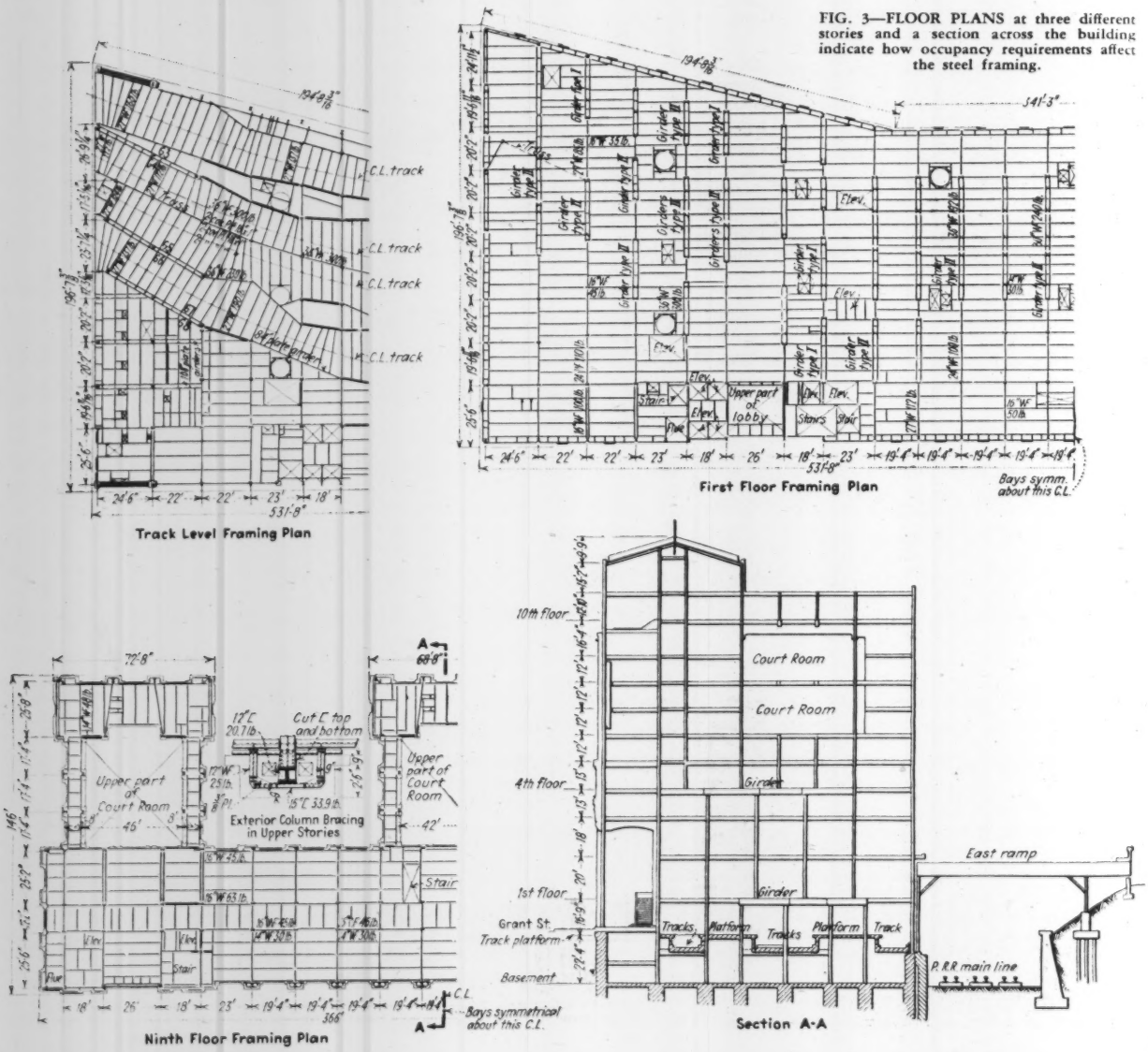


FIG. 4—FIFTEEN THOUSAND TONS of steel were erected in the new Pittsburgh post office. View taken from P.R.R. station shows Federal Reserve Bank, Gulf Oil and Koppers buildings facing the post office.

the column spacings of the adjacent levels, column transfer girders were used to bridge the gap, as shown in the section on Fig. 3.

Shallow girders required

Shallow or cramped girders at the first-floor level were necessary because of the architectural requirements and the desirability of keeping the first floor as near to the Seventh Ave. grade as possible. The elevation of the under side of the girders over the track area was determined by the headroom required by the Pennsylvania Railroad main line. With this known and the maximum girder depth determined, the first floor was established 20 ft. 11 in. above the top of rail at the track level.

Different types of column transfer girders, as shown in Fig. 5, were employed for these conditions, the deepest being 37¼ in. out to out. The heavier type girders in some cases supported columns carrying ten stories of floors and walls, amounting to as much as 900 tons. Girder types I and II are of conventional form except that an extra pair of angles with freestanding legs is used on each flange of type I, in order to increase the capacity and at the same time hold the same out-to-out dimension. By varying the coverplates on type I from 0 to 2¼ in., a resisting moment between 1,120 and 2,050 ft.-tons was obtainable. Comparable figures for the type II girders, with coverplates varying from 0 to 3 in., were 600 to 1,730 ft.-tons.

At the first-floor level thick steel slabs were used to spread the column loads to the girders, as shown in Fig. 5. To prevent projection of these slabs through the floor outside the fireproofing of the columns, a stepped construction was employed. The thickness of the lower slab was limited to 4 in., to bring the top face well below the floor finish. Over this was placed another slab of the thickness required and of an area within the area of the column fireproofing. Slabs were also used below the bottom flange of the girders as column caps.

At the fourth-floor level it was necessary to keep the girders shallow because of the desire to have as much headroom throughout the length of the third story as possible. By the use of coverplated beams and girders a maximum depth of 37 in. was obtainable. The typical details and sections for these girders are shown in Fig. 5. The largest column load carried by these girders was 610 tons, and the largest resisting moment per girder was 1,470 ft.-tons.

The exterior columns in the upper part of the building, which were between deep reveals, presented a problem in column bracing because of the ducts on each side of the column and the location of the spandrel beam. Along the front wall these beams were 2 ft. 4¼ in. off the center line of the column. Along the court wall they were 1 ft. 6¼ in. The spandrel beams in these bays were located to span a full bay, miss ducts and support the inner wall of the reveal. In order to brace some of these columns adequately, it was necessary to reinforce the girder, at the end, between the spandrel beams and the columns, for lateral stability. This is shown as a detail on the ninth-floor plan of Fig. 3.

A new girder form (*ENR*, Oct. 29, 1931, p. 686) proved very adaptable where conditions required girders of shallow depth, clear flanges of large capacity, or simple and economical design. The central flange element of these girders is a split beam or split column tee. Around this central element may be added angles, web plates and coverplates as desired. In the present instance two thin web plates were used, enclosing the tee between and providing greater riveting capacity. It was used for railroad girders, both inside and outside the building, for column transfers and for ramp girders.

At the track level at the north end of the building, six girders, G3 to G8 (Fig. 3) and a story-high truss were designed to carry four railroad tracks, loading platforms and column transfers over the trucking space in the basement story. These girders use the new gir-

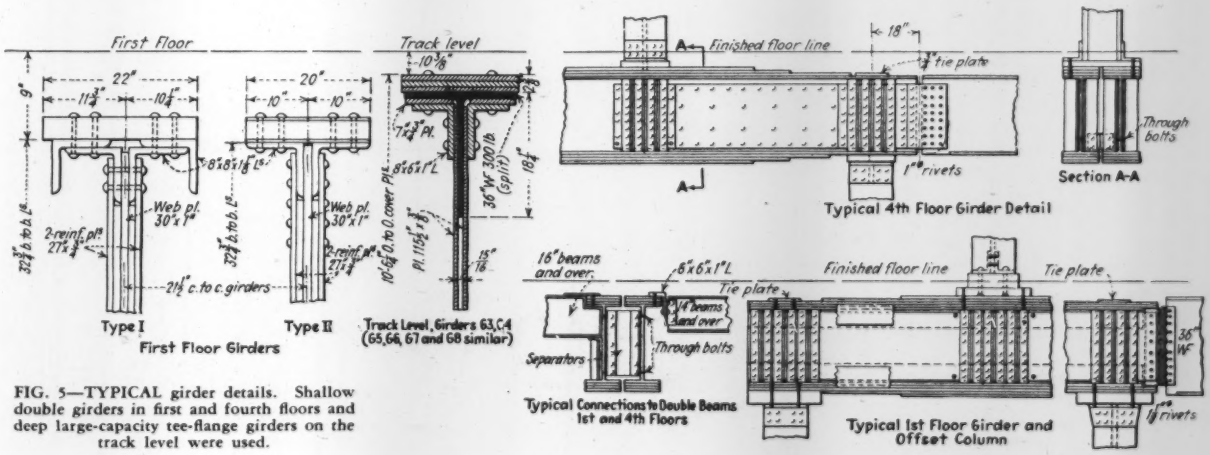


FIG. 5—TYPICAL girder details. Shallow double girders in first and fourth floors and deep large-capacity tee-flange girders on the track level were used.

der form in a coverplated type. Their top flange is framed just below the track-loading platform slabs. They are 10 ft. 6½ in. out to out in the maximum case. The webs are two 115½x⅜-in. plates, while each flange consists of a tee (half of a 36-in. 300-lb. beam), two 8x6x1-in. angles and coverplates as required. The largest column load carried by these girders was 1,072 tons. A bending moment of 8,920 ft.-tons per girder in the maximum case was accommodated where the girder span was about 50 ft. The track-level girder details are shown in Fig. 5. Each member of the pair of girders was designed to take one half of the load imposed upon the pair.

Moment connections on the beam end and stiff separators between the pairs of girders were provided to secure equal transference of stress to each girder

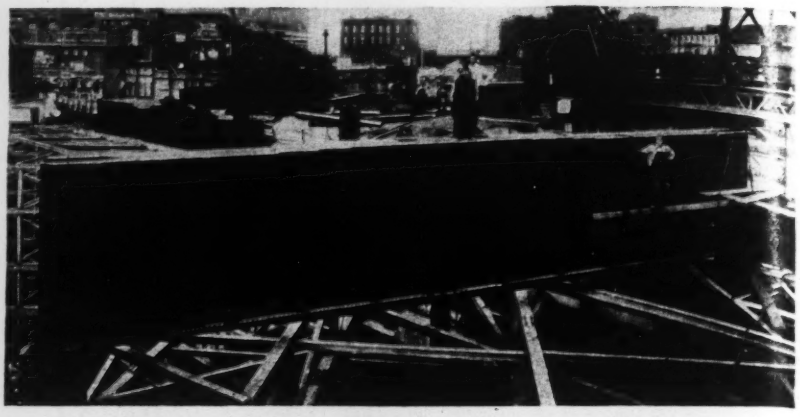


FIG. 6—ERECTING A PAIR of tee-flange girders 126 in. deep, to carry main-line railroad tracks into the Pittsburgh post office. The nucleus of the flange is a split 36-in. 300-lb. beam.

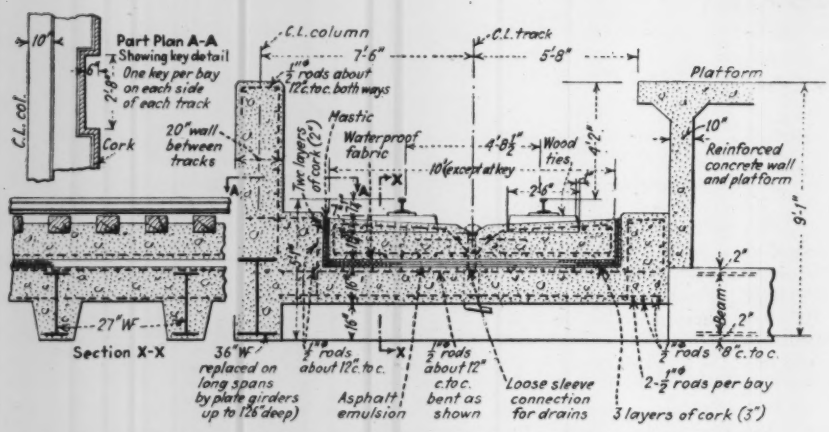


FIG. 7—TRACK CONSTRUCTION within building was designed to isolate sounds and vibration by means of layers of cork.

when the load is applied to one side only.

The problem of isolating from the other parts of the building the noises and vibrations attendant on more than 2,000 ft. of railroad track consisted of obtaining a method of isolating the steel building frame and preventing its use as a transmitter. The obvious method of using separate supports for the track was not possible because of the need of all available space for trucking and mail-handling machinery. After considerable study it was decided to use the building columns to support the track, and the track-bed construction shown in Fig. 7 was adopted. Between track beams, spaced at 4- to 5-ft. intervals, a thick reinforced-concrete slab was poured. Over this was laid a cork blanket consisting of three 1-in. layers of light-density cork. Finally a continuous "floating bed" of reinforced concrete was poured, designed to carry the tracks and spread the wheel loads at a permissible unit pressure to the cork layer below.

To prevent creeping of the floating bed on the cork along the direction of the track, keys were made at intervals of about 20 ft. on each side of the track. The key consisted of molding a rectangular depression in the track shoulder, lining it with cork and then filling this depression with reinforced concrete to form rectangular lugs on the floating bed.

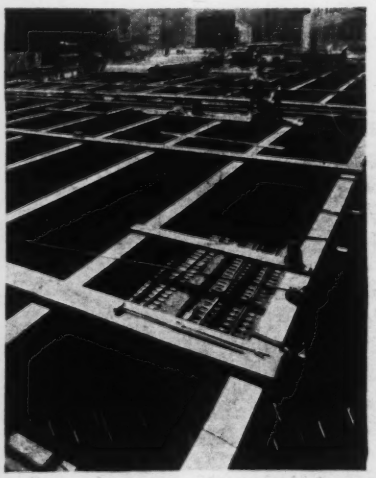


FIG. 8—EAST RAMP FRAMING, showing split-beam flanges of girders clear of cover rivets.

The track drainage is handled by drain-pipe sleeves embedded in the floating bed at frequent intervals and projecting into, but not in contact with, a larger pipe embedded in the main supporting structure.

In analyzing the track-bed construction from a physical and mathematical viewpoint, the cork bed was considered (at the stresses used) as providing a continuous elastic support on which rested the "floating bed" beam with its concentrations. Formulas were developed for obtaining the working stresses in the component parts of this construction. Obviously the critical points of the track-bed problem were: (1) not to exceed the unit compression value of the cork; (2) to keep the working stresses in the concrete slabs from being too high; and (3) to keep the deflection that causes the trains to roll uphill, from being too great.

Under maximum loading conditions the cork is stressed up to 10.3 lb. per sq.in., and a deflection of 0.103 in. occurs.

North ramp

As stated previously, there are two ramps located outside the building and known respectively as the north ramp and the east ramp (Fig. 10). The north ramp is a depressed roadway pitching from Grant St. to the basement trucking level. As shown in Figs. 2 and 10, it parallels the north wall of the building until it reaches and starts under the overhead deck carrying the four railroad tracks that enter the building, where it curves sharply to the building line and trucking entrance.

The railroad-track deck over the ramp roadway consists of a series of girders set on and anchored to reinforced-concrete retaining walls and fanned out from the inner to the outer supports (Fig. 9).

With the track elevations and the location of the ramp roadway fixed, the problem of vital concern was that of clearance and headroom. The shal-

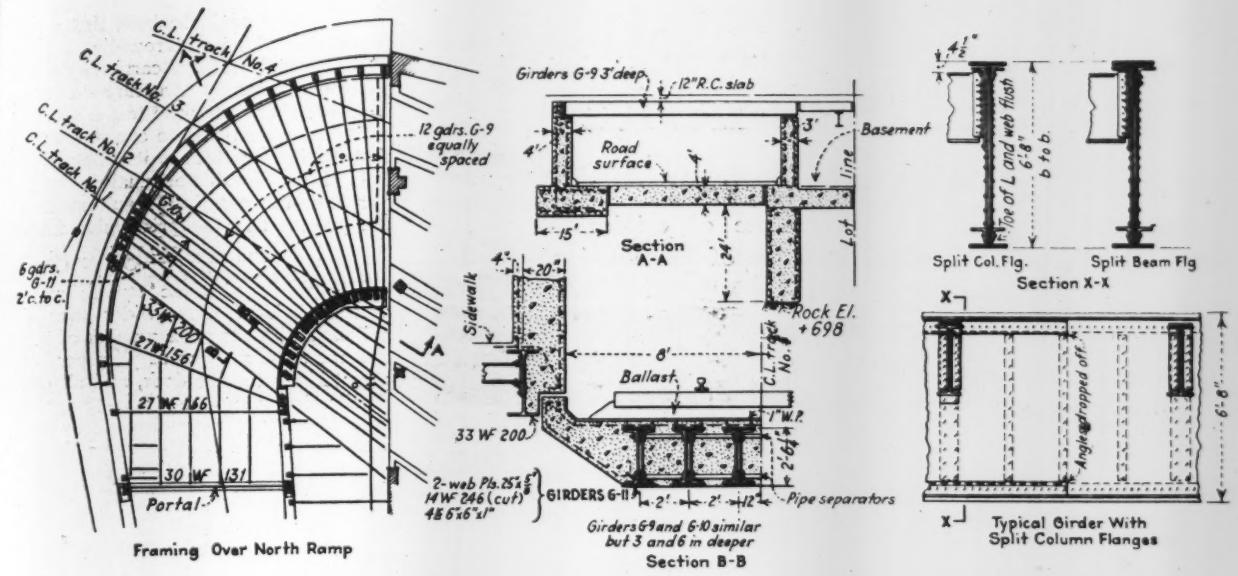


FIG. 9—RAMP GIRDERS are of tee-flange type. The shallow depth possible for large-capacity girders of this design was an advantage on the north ramp where headroom was limited.

lowest girders that would do the work required were desired. For this problem the new girder form was used. Because of the shallowness of the girder the allowable fiber stress was reduced. Fig. 9 shows a section through the ramp at the point of minimum clearance between the track deck and the ramp roadway.

East ramp

The east ramp is an irregular-shaped structure that provides access for mail trucks from Seventh Ave. to a second-floor loading platform located over the Pennsylvania Railroad main-line tracks. The main loading deck and the upper portion of the inclined ramp consist of structural-steel frames covered over by a reinforced-concrete platform slab, as shown in Figs. 8 and 10. The frames were separated into units by expansion joints at intervals of 66 to 100 ft., and braced laterally by kneebraces and bracing trusses at the column supports. The beams and girders of the main loading deck were held level, and the platform slab was crowned at the center, to drain to gutters along each side. The stringers and floor beams of the deck were designed for 25-ton-truck wheel loads closely spaced. The narrower ramp portion was designed for one line of trucks with an allowance of 30 per cent for impact. The long span girders were designed for a live load of 160 lb. per sq.ft., including 30 per cent impact. The total weight of structural steel required for the north and east ramps was 1,000 tons.

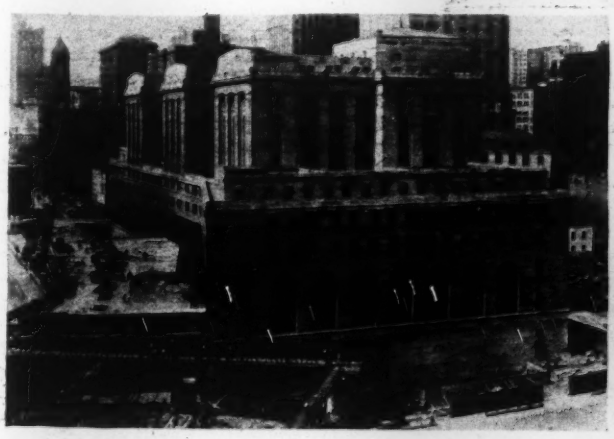
The girders used to span over the main-line tracks of the railroad in this ramp were similar in form to those in the north ramp in that they utilized split-beam or split-column tees for flanges. The clear flanges eliminated flange riveting and did not encroach into the platform slab (as stepped covers would), and in the case of the bottom flanges were cheaper to incase. Fig. 9 shows a part section of the girders. With the beam connections shown and no interfering stiffener angles required due to the stiffness of the double web, the erection of the filling-in beams was a simple matter.

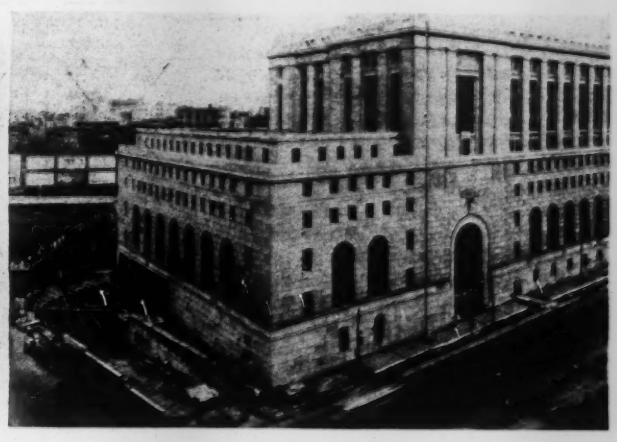
The largest split-beam sections used to date were incorporated in this ramp. Two 7-ton tees were provided from a 36WF 300-lb. section having a length of 92½ ft.

Personnel

Trowbridge and Livingston, New York City, were the architects on this project. Weiskopf and Pickworth, New York City, were the consulting engineers. Aronberg Fried Co. Inc., New York City, was the general contractor, and the Fort Pitt Bridge Works, Canonsburg, Pa., was the structural-steel fabricator.

FIG. 10—TWO TRUCKING RAMPS serve the building. East ramp (left), spanning P.R.R. main line, provides access to an outdoor loading dock. Framing (right) carries railroad tracks into building over north ramp which leads to basement level.





Maine Recreates the First Pile Bridge in America

Sewall's Bridge at York, built in 1761, replaced by modern timber structure, preserving appearance of original—Piles 172 years old found in fair state of preservation

By Philip Dana Orcutt
Architect, Boston, Mass.

A NEW timber trestle bridge at York Village, Maine, recently opened to traffic by the state highway department, is notable as recreating, in appearance at least, the original bridge built on the site in 1761. The structure has national significance because the original, built by Major Samuel Sewall, described contemporaneously as a great architect, is believed to be the first pile bridge built in America. Prior to this, the few bridges of more than one single short timber span used primitive rock-filled timber cribs as piers. Authorized in 1742, the bridge was not built until twenty years later because of a depression and a war with the French Colonies. The bridge, of fourteen spans, including a drawspan, is recorded as having created an immediate sensation in the engineering world. Major Sewall was soon commissioned to build a similar and larger bridge between Boston and Charlestown, from which the Mystic River, Beverly and Malden bridges were copied. This type was soon introduced into Europe by the American engineers Cox and Thompson.

The method of construction, as then described, follows: "The piles or posts were of different lengths, the length being determined by probing the bottom of the river or mud with a pointed iron affixed to a long pole, and, having ascertained the various depths of the mud in a section, a whole section, containing four piles or posts, was framed, well braced, and the cap sill fastened on. At still tide it was floated to its place, and, by dint of labour, set upright and guyed. Large and heavy oak logs, the tops or lighter ends of which were secured inland, were then made use of, and the butts raised by tackles to a proper height; and by the striking of detents or latches, the ropes were released, the logs fell with great force upon the caps, and by their impetus this section was driven to the depth desired." This was found to be about 3 ft. Later piles were driven 4 to 5 ft. deep; the new ones average 10 ft. The original augers, chisels, latches, probes, and some of the other implements are still preserved.

In the course of 172 years, the original structure had been materially altered by repairs, replacements and such adaptations to changing conditions as widening the draw and providing facilities for carrying the local trolley. In 1933 the secondary road that crossed the bridge was extended to join a shore boulevard, which materially increased the traffic. The bridge was found to be in quite bad condition. State aid was asked to replace it with one of concrete.

FIG. 1—DECK of new bridge consists of 16-in. stringers carrying flooring of 2x4's. Surfacing, not shown, is of 1-in. asphalt plank.

Immediately there was a strong protest. The opposition was based both on the historic and antiquarian importance of the bridge itself and the wish not to decrease the appeal of a resort neighborhood by eliminating a famous landmark. As the district contains both estates and many houses built in colonial times and occupied in most cases by descendants of the original builders, it was hoped that a bridge could be built that would harmonize with its surroundings. Most of the through traffic is carried by Rice's Bridge, a concrete structure on U. S. Route 1, about one mile to the north.

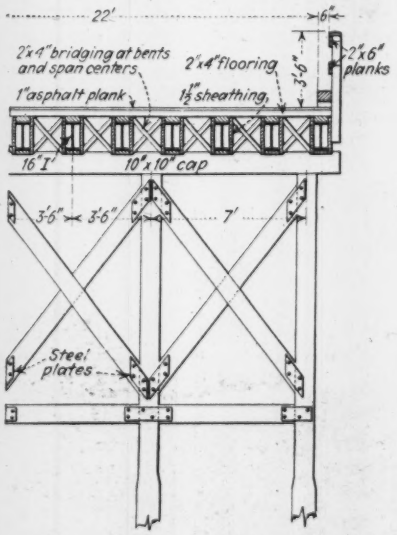


FIG. 2—DUMMY DRAWSPAN, 30 ft. long, utilized 16-in. I-beam stringers hidden by wood sheathing.

Studies were made, to evolve a bridge that would reproduce in its essential details Major Sewall's original design and yet meet the practical requirements of the present and the predictable future.

The new bridge

The result of these studies was a wooden bridge, 2 ft. wider than the original, with the same number of bents and the same number of piles per bent, a materially thicker deck, and all other details, including the draw (originally raised by a man-powered windlass but in the new bridge a dummy span), preserving the appearance of its historic predecessor.

The deck is of 1-in. asphalt plank on 2x4-in. flooring set on edge, on 6x16-in. stringers on 10x12-in. caps. There are thirteen bents, each of four piles (10 in. square at the butt, square hewn for 20 ft. from the top) with a batter pile at each end of each bent. The latter were added to the original design because of the severe ice conditions of last spring. Undoubtedly batter piles were added to the original bridge soon after its construction for the same reason. The current at the site is 2 ft. per second at half tide on both ebb and flood.

All spans are 17 ft., except one of 30 ft., for the dummy draw. The latter is carried on concealed steel I-beams. The rail posts are 6x6 in., the rails 2x8 in., and the curbs 9 in. high.

A water pipe (completely enclosed) and the telephone wires are carried under the floor between the stringers. No provision has yet been made for electric wires, except to stipulate that no poles will be attached to the bridge.

The original piles were square-hewn white oak, cut from a stand in the immediate vicinity. A number of these still survived, cut down to a maximum length of 20 ft. above the mud line but still incorporated in the structure. When removed, they proved to be much sounder than the later piling, indicating that the marine-borer problem is not yet serious in this locality. Nevertheless it represents a potential difficulty, and treated piling is used in the new structure. Since white oak cannot be treated satisfactorily, the new piling and caps are long-leaf southern pine, pressure-treated with creosote. The batter piles are of treated Norway pine grown in New England. All the other lumber is long-leaf southern pine treated with zinc meta arsenate. The rail posts, rails, curbs, scupper blocks and outside stringers were also twice brush-coated with creosote 30 days after the ZMA treatment. (Had paint been desired, 60 days' delay would have been necessary).

Reference has been made to meeting heavy traffic conditions, and while this factor must obviously be taken fully into

account, it was water, both rain and salt, that destroyed the original structure, and it is water that destroys most wooden bridges. I do not refer to that portion of the piling which is at all times under water, as we have examples of the survival of prehistoric submerged piles. Decayed fungi thrive best on wood that has a fluctuating moisture content. This bridge had never been treated with even superficial preservative, and the piles between high and low water rotted through. If the tops of the piles had ever had metal flashing, it had long since disappeared, exposing the end grain of the piles that projected on both sides of the caps. The rot that developed at this vital spot communicated itself to the caps. Had it been possible to protect the old lumber as the new will be, its useful life should have been extended another century for all except the heaviest loads.

In the course of the studies made for this bridge it developed that a similar type could be used to economic advantage as well as appropriateness in many rural districts, where a concrete bridge would be a discordant note in an otherwise harmonious landscape.

The estimated cost of the concrete bridge was $26,500, and of the wooden bridge $16,000, a saving of 35 per cent, or $10,500. The interest on this saving is enough to pay for the maintenance and to leave a surplus sufficient to build a new bridge in 50 years. In that length of time bridge needs are likely to change in many communities.

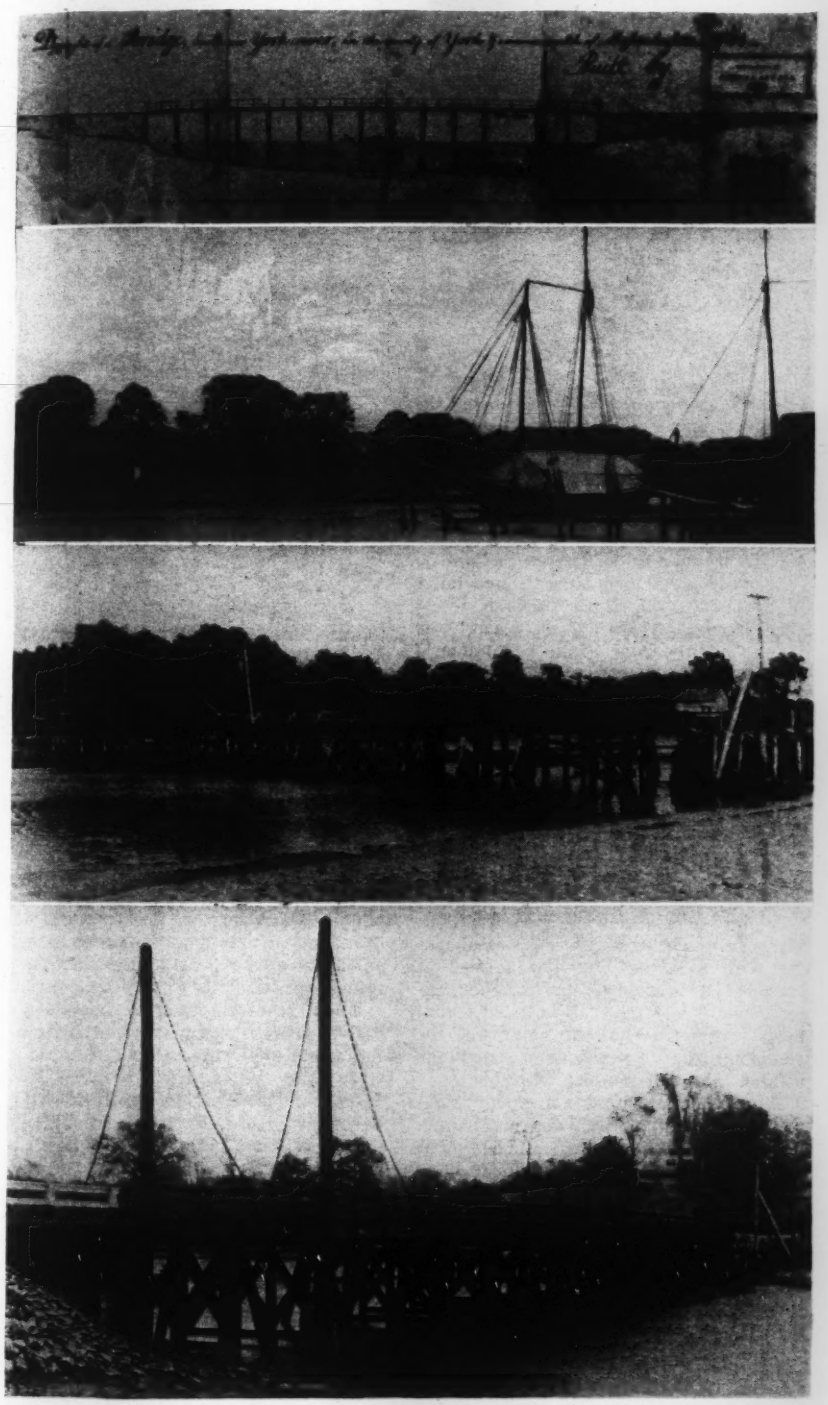
Further, concrete bridges are not exempt from maintenance costs and deterioration both from weather and salt water.

The record of Sewall's Bridge is: built 1761, required major repairs in 1794 (33 years); virtually rebuilt, 1849, 55 years; practical life, 88 years; required major repairs, 1873, 24 years; rebuilt 1934, 61 years; 85 years practical life.

The maintenance cost of this bridge for 70 years, from 1850 through 1919 (before which figures are not available, and after which they are merged with those of other bridges), is $275.23 per year, including the one virtual rebuilding and one of the two major repairs. Remembering that this bridge was in no way protected either from the elements or from marine borers and was subjected in its later years to stresses beyond the dreams of its builders, the new bridge should double this record of performance at a proportionately lower cost of maintenance.

The new bridge was designed by the bridge division of the Maine state highway commission (Max L. Wilder, bridge engineer) from plans prepared by Orcutt and Patterson, architects, Boston.

FIG. 3—EVOLUTION of the first pile bridge in America. In order from the top: Major Sewall's drawing of the original design in 1761; photograph taken in 1883; the bridge as it appeared in 1933; and the new bridge opened this fall. Note the dummy drawspan complete with operating chains on the new bridge.



PWA Financing for Schools

School buildings to cost an aggregate of $160,603,032 have been financed by the PWA program. A survey of the allotments made for schools, college and other educational buildings up to Aug. 14 showed that this direct financing totaled $126,755,474, with the balance of $32,847,558 produced through local financing.

The distribution of this PWA financing extended into every state and territory, and the allotments varied in size from a few thousand dollars for local district schools to $2,250,000 for the Bayside High School of New York City. In addition to the financing of schools, the PWA has allotted $1,162,800 for public libraries.

Comments on Concrete Road Design

Past and prevailing practices in concrete-road design and construction considered in the light of theory and experience, as told to the editor by P. M. Tebbs, assistant chief engineer, Pennsylvania Department of Highways, Harrisburg, Pa.

CONCRETE PAVEMENT along the Delaware Canal, with a 6:8:6-in. section 18 ft. wide, 25 lb. of reinforcement per square yard and transverse joints about every 125 ft., built in 1919 and bearing present traffic and the onus of inferior design apparently without undue fatigue.

THE BUILDERS of concrete roads can reasonably claim to have been leaders in the study of pavement design and construction. Because their determinations have so gradually materialized in practice, engineers are prone to forget how much higher in engineering quality the concrete road of 1934 is than the concrete road of 1924. The difference is stupendous. But with all his accomplishment in perfecting his product, the concrete-road builder is vitally conscious of the great distance yet to be traveled in design methods and construction practices. To arrive at some phases of current thinking, inquiry was made of P. M. Tebbs, assistant chief engineer, Pennsylvania department of highways, and a summary of his remarks is given.

How much progress has been made in rationalizing slab design?

▶ The first design for concrete pavements made provision for transverse expansion joints about 30 to 40 ft. apart, from which practice many have strayed afar and are now returning. The crown of the pavement was 2 in.—a broad forward step compared with other prevailing types at the time when crowns from 4 to 6 in. were used for similar widths.

A flat subgrade was used for convenience of construction, ease of checking with a string line and because it provided a thickened slab at the center, since it was generally conceded that most traffic traveled the center of the road and only occasionally used the thinner edge for passing.

Pennsylvania's first pavement slabs were reinforced with 25-lb. metal mesh placed 2 in. below the surface. The concrete mixture was a modification of the best grade of structural concrete then being specified, the modification being the omission of one part of stone in order to give an excess of mortar to facilitate finishing. From the very beginning a smooth finished pavement was demanded.

The design practice described was, in general, used throughout the World War period. From 1919 to 1924 there was a change from the thin-edge section to a uniform-depth section of 6, 7 or 8 in. Greater use also was made of steel reinforcement consisting of longitudinal bars, bar mats or some type of fabricated mesh. From the beginning construction progressed steadily, regardless of the principles of design being applied. Design to a great extent followed construction and has been principally a process of improvement and refinement.

Then research took a hand. The earlier research projects that produced the greatest contributions to design were: the Bates Experimental Road (Bulletin No. 21, State of Illinois, Department of Public Works and Building, Division of Highways); the Pittsburg (Calif.) tests, and the United States Bureau of Public Roads investigations at Arlington, Va., which culminated at about the same time. Following these tests, slab designs in general were changed to embody the main conclusions. The more important changes included thickened outer edges, doweled longitudinal joints separating the pavement into lanes and the more

general use of reinforcement placed approximately 2 in. below the surface of the pavement. In ten years there has been no change in these fundamentals of design. Research has continued, however, to include the mathematical analysis of the structural design of the pavement slab itself. Following the fundamental work of Older and Westergaard, Frank T. Sheets has compiled a pamphlet (Concrete Road Design—Simplified and Correlated with Traffic, Portland Cement Association, Second Edition, March, 1934), which ably presents the principles of design for slab strength. Naturally a treatise on design, based upon average conditions, must be properly interpreted for use under specific conditions.

What are the design factors that primarily should have consideration?

► Preliminary to the design of an economic pavement for a highway, traffic data should be available (Transportation Survey Reports, U. S. Bureau of Public Roads). From such data the wheel-load characteristics may be determined. A careful analysis of this information is required in order that design may be adequate for present loads and for future requirements. The decision as to what traffic will be provided for involves more than a reference to tabulated survey data. Some three or four years ago it was practically impossible to foretell that the trucking of coal over our highways from the mine to the consumer for distances of a hundred miles or more would be a regular year-round industry. However, this is the case in Pennsylvania. These trucks continually seek out new routes and points of delivery.

Another factor is that foundation or subgrade materials vary greatly in character and capacity to support the pavement with the superimposed loads, due to changes in moisture content, freezing, thawing, etc. This condition may be corrected by: (1) subgrade treatment to increase its strength and make it more uniform; or (2) a stronger slab may be used to overcome or bridge the subgrade weakness, or the two methods may be combined. Stabilization or drainage may be used in the first instance where the condition is susceptible to such correction; where there is such lack of uniformity of conditions, or where the cost of sub-base or other treatment is too great, a special design of reinforced slab may be the best solution. Research has been very active, and more is known about soil stabilization than ever before.

Coming to stresses, the designer has much to think about. The corner-stress formula developed by Older in connection with the Bates Road tests has been most largely used. This formula involves a simple moment relation, assuming the load is applied at an unsupported corner of the slab. A more elaborate analysis of slab design has been developed by Dr. Westergaard, but on account of the higher mathematics involved it has not been used so extensively. Dr. Westergaard has more recently developed a supplementary theory of design (Analytical Tools for Judging Results of Structural Tests of Concrete Pavements, by H. M. Westergaard, *Public Roads*, Vol. 14, No. 10). Either the Older or the Westergaard formulas check closely with measured stresses when properly used. However, many of the most destructive forces are not measured.

It is my opinion that on the heavier soils in the deep freezing area such as Pennsylvania, the effect of the elements upon rigid slab pavements is more destructive than an average traffic of 1,000 vehicles per day, and therefore the lighter slabs are precluded from use in this or any similar area except where natural drainage conditions and subgrade soils are excellent.

I am convinced from our experience that in an industrial state like Pennsylvania we should use somewhat thicker inner edges than are given by the formula. Our minimum concrete pavement has an 8-6-8-in. cross-section. A majority of our pavements on main routes are 9-7-9 in., while particularly heavy-duty pavements are 10-8-10 in. We have had no failures with such sections, whereas with various lighter sections our experience has not been so satisfactory.

Slab strength varies nearly as the square of the depth. Thus a 10-in. slab is twice as strong as a 7-in. slab, and a 7-in. slab is twice as strong as a 5-in. slab. The inertia of the slab varies directly as the weight; hence an impact force of definite magnitude is less destructive to a thick slab than to a thin slab. Thus it can readily be seen how valuable an investment is the relatively small cost of increased depth of slab, both as insurance against failure due to unanticipated conditions and in increased life. This brings us to an important question.

The economical life and salvage value of a pavement are matters of opinion (Resurfacing with Portland Cement Concrete, by E. M. Fleming; P. 208, Vol. 12, *Proceedings*, Highway Research Board). Some years ago engineers rather generally advocated a salvage value for concrete slab. Some of the leading highway engineers now believe that no allowance should be made for salvage value and that it is more economical to scrap old slab and build entirely new. Very often the crux of the situation rests on the question whether the existing alignment and grades are satisfactory at the time when reconstruction is necessary. We have widened and resurfaced in Pennsylvania a small mileage of old concrete pavement with a new reinforced-concrete surface 5 in. thick at a cost less than would have resulted if the old slab had been removed. The new pavement has given good service for several years, and apparently it will continue to fulfill the traffic needs as satisfactorily as a new pavement.

In the matter of joints the federal government has virtually taken choice away from the states. Design with reference to transverse and longitudinal joints is covered in a memorandum from Thos. H. MacDonald, chief of the Bureau of Public Roads, to his district engineers under date of March 3, 1934, in part as follows:

> In approving the expenditure of federal funds for concrete pavements on future projects, therefore, it will be required that: (1) Expansion joints be used at intervals not greater than 100 ft., providing expansion openings not less than ¾ in. nor greater than 1 in. (2) Provision is to be made for load transfer across expansion joints, either by the use of dowel bars or other devices that will accomplish the same purpose. (3) Provision is to be made for crack control between expanison joints by the use of steel reinforcement, or suitably designed transverse contraction joints or planes of weakness so spaced that the distance between such contraction joints or expansion joints does not exceed 30 ft.

Due to these instructions of the Bureau of Public Roads, considerable stimulus has been given the already active commercial development of load-transfer designs and expansion-joint devices to avoid the infiltration of inert material, extrusion of the filler and free entrance of surface water. At present, conclusions regarding these various joints are premature.

What improvement has been made in concreting practice?

► The water-cement ratio for determining the strength of concrete is now generally accepted by road engineers. Tests of concrete through cycles of alternate freezing and thawing also show that the durability of concrete as affected by freezing and thawing depends on the water-cement ratio. As the water-cement ratio increases, the durability decreases. For maximum strength and durability the water-cement ratio should be as low as practicable. Data indicate that concrete with a water-cement ratio of 0.8 will not be adequately durable under severe conditions of exposure. (Resistance of Concrete to Frost Action as Affected by the Water-Cement Ratio, by F. H. Jackson, Vol. II, p. 227, *Proceedings*, Highway Research Board). It appears from incomplete data that in the effort to secure an easily workable and plastic mix too much sand or fine aggregate has been used. In present laboratory tests of portland cements the 200-mesh sieve has largely been discarded in favor of the surface-area-per-gram method. (Comments on the Hydrometer Method of Mechanical Analy-

sis—*Public Roads*, Vol. 14, No. 6; and Low-Heat Cement Specifications of Tennessee Valley Authority, *ENR*, May 10, 1934.)

Engineers have been concerned with the effect on concrete when cement at high temperature is used. To determine the facts, tests were made by five laboratories in the production of twenty mills. (Vol. XI, *Proceedings*, Highway Research Board, p. 218.) In addition, several highway departments have studied the effects on paving operations. As a result, the following conclusions were reached: (1) With a constant water-cement ratio, increase of temperature of concrete decreases workability. (2) Increasing the temperature of cement paste accelerates the initial and final set. The investigations disclosed the following facts:

When cement at 150 deg. F. was used in concrete, it affected the flowability to such an extent that it might not be considered workable 30 and 45 min. after mixing. This is an important point because in the construction of concrete highways it is not unusual for the manipulation to be carried on 45 min. after the concrete has been discharged from the mixer. This may result in effects similar to those caused by the so-called late working of concrete and may cause scaling or other defects.

The strength of specimen of concrete placed at temperatures up to 160 deg. F. was somewhat decreased up to the age of three months but was a little greater than cold cement concrete at one year. It appears desirable, therefore, to specify a maximum allowable temperature for concrete.

Progress can be recorded in winter concreting. Today, to extend the active construction period over a greater part of the year than was formerly the practice, work must be performed at temperatures below those usually considered satisfactory. Generally the atmospheric temperature at time of mixing should be above 40 deg. F. and preferably above 50 deg. F. At temperatures below 40 deg. the mixing water should be heated to the boiling point, and in some cases it will be found advisable to heat the aggregates. Practically no increase in strength of concrete will take place while the concrete is at freezing temperature, and increase of strength below 40 deg. F. will be slow. Adequate cover or other protection, therefore, should be provided at low temperatures until the concrete has reached a reasonable strength.

At temperatures below 50 deg. a 2 per cent solution of calcium chloride added to the mixing water will accelerate the hydration of the cement and supplement the protective measure. In our Pennsylvania practice 1½ per cent of calcium chloride is used in the mixing water in hot weather and 2 per cent in cold weather.

Recent short-time tests have led to tentative conclusions that calcium chloride increases the rate of heat development in standard cements, the flow of concrete is increased, and the soundness of cements is not affected. (Progress Report on the Reaction of Calcium Chloride on Portland Cement; and Early Strength Concrete — American Road Builders' Association Bulletin 42.)

At low temperatures and also when the pavement must be opened quickly to traffic, a high-early-strength concrete may be produced: (1) by using a high-early-strength cement in place of the standard portland cement; and (2) by decreasing the amount of mixing water and increasing the proportion of standard portland cement. The use of such concrete has been perfected during the past few years, especially with high-early-strength cement. The high-early-strength mixture with standard cement has not been used extensively due to mixing time and manipulation required in obtaining dense concrete with a relatively dry mix, but it now appears that mechanical vibration could be used to great advantage in this case.

It is generally conceded that the more coarse aggregate of suitable quality that can be incorporated into a given mass of concrete, the greater its strength and resistance to abrasion. Research and experimentation are now under way, using mechanical vibration of concrete to facilitate the proper finishing of a relatively dry and stony mix. Several of the states are working on this problem, and the Bureau of Public Roads (*Public Roads*, Vol. 14, No. 8; *ENR*, May 3, 1934) is continuing its investigations.

Observation indicates that a harsh and resistant concrete that will carry the vibrations through the mass is essential, while the effect of vibration upon a soft concrete is injurious, puddling soft mortar around the vibrating unit, thus causing local segregation. Internal vibration appears to have possibilities beyond those of surface vibration, and developments along these lines will be watched with great interest. It appears that the use of vibration in the placing and finishing of concrete may be one of the most important steps forward in recent years, in producing economically a dense, uniform and strong concrete.

What promise do new curing methods offer the roadbuilder?

► Road officials are familiar generally with the usual methods of curing pavements (Report of Project Committee on Curing of Concrete Pavement Slabs; and Intermittent Curing of Concrete, by F. C. Lang, p. 331, Vol. 12, Highway Research Board). But in recent years several variations have been used with more or less success. These include several kinds of paper or cloth coverings or mats, spraying the surface of the concrete after set has taken place with a bituminous material, dusting or spraying cement on the slab after finishing, surface use of calcium chloride and a cotton mat.

A cotton mat (*Public Roads*, Volume 12, No. 5) approximately 1/3 in. thick, with a burlap covering and quilted to prevent displacement of the cotton, has been used this year with excellent results. The mat is a little heavy to handle and has a somewhat higher first cost than some other curing methods, but has a resonable life and is generally satisfactory from the standpoint of the contractor. A preliminary wetting of the mat is sufficient for the curing period. The mat has the particular advantage over other methods of surface curing of maintaining a more uniform temperature in the concrete, with slow moisture evaporation, during the vital curing period of 24 to 72 hours. This is of particular importance, as data show that the slab will crack from volume changes

CRACK CONTROL being so intensively studied in present-day pavement design is justified by the common sight in old pavements of the irregular and forked cracks illustrated here.

when the resulting stresses exceed the tensile strength.

It appears from data now available that the use of a cotton mat for surface curing, supplemented by the addition of calcium chloride in the mixing water, should ordinarily yield very satisfactory results.

The curing of concrete has been a very active field for commercial development, including chemicals, surface coatings, blankets, etc., only a few of which are effective in maintaining reasonably low and uniform temperature and moisture content.

Are generally better results being secured in pavement smoothness?

► Present practice requires in general that the surface of concrete be checked for irregularities immediately back of the finishing machine with a 10-ft straight-edge. Variations of ⅛ in. or greater are corrected before final finishing of the concrete. After the concrete has taken final set, it is again checked by means of straight-edge or profilometer, and all high spots of more than ⅛ in. are marked for grinding. Many miles of concrete pavements are now completed, with no variations of the surface from a true plane greater than 1/16 in.

ROUGHOMETER RECORDS OF PAVEMENT SMOOTHNESS

Year	Miles of Pavement	Roughness Per Mile	Rating of Surface
1928	331	30.3	Good
1929	352	18.8	Excellent
1930	779	15.8	Excellent

RATING OF SURFACES

Roughness Factor	Rating	Motion of Vehicle
Less than 25	Excellent	No perceptible vibration
26 to 40	Good	Slight vibration
41 to 65	Fair	Noticeable vibration and slight lurching
66 to 90	Poor	Noticeable vibration and lurching
91 and over	Very poor	Disagreeable vibration and lurching

The roughometer designed by the Bureau of Public Roads has proved to be a valuable instrument in Pennsylvania. As soon as we had a car properly equipped with one of these instruments, we announced that all completed pavement sections would be tested. Immediately the engineers were on their toes to obtain the best possible results. The whole organization, including the inspectors and the contractors, was thrown into competition. Some contractors offered a bonus to their finishers for the best results.

The improvement noticed in riding qualities was very satisfactory, and the men soon learned that it takes no more work but only a little more skill to obtain the best riding surface. The accompanying figures show the weighted average of riding surfaces from roughometer determinations (Pennsylvania reports on tests and investigations, 1931).

Is control of construction becoming more certain?

► Samples of all materials, including water, are now generally tested before starting a concrete road project and when deemed necessary during the construction operations, thus affording a rigid control over quality of materials. To determine the strength of the concrete in compression, it is the practice to mold two cylinders 6x12 in. from one batch of a representative mix for each ½ mile of pavement. These are cured in a manner similar to the pavement for four days and then shipped to the laboratory, where they are tested at the age of seven days. The determination of transverse strength of the concrete is made by testing four beams 6x8x40 in. for at least each ½ mile of pavement. Plain beams are molded from a representative batch of concrete and cured in the same manner as the pavement. Tests of beams are made in the field by means of a special testing apparatus at the age of ten days or as otherwise directed. The modulus-of-rupture test is now used by nearly all states in the control of strength at the time of opening a section of highway to traffic as well as for general control.

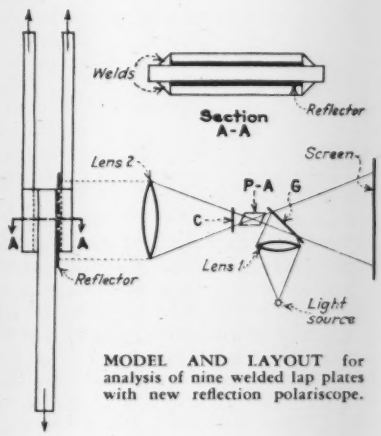
What is the final requirement for a well-built road?

► Engineering training and experience, specifications, design and research all count for little unless the fundamental principles of every component factor are built into the structure. In my estimation, many of the faults and varying results in pavement structures for which research is endeavoring to discover causes, and the inconsistencies in test results are due to careless and non-uniform production practices. I am convinced that it is fully as essential to apply engineering principles in construction methods as in design and, therefore, no less skilled personnel should be used on construction.

Welded Joints Studied With New Type Polariscope

PHOTO-ELASTIC STUDIES of problems involving two parallel systems of plane stress, as represented by the stress distribution in the overlapping plates of side-welded connections, are possible with a new type of polariscope developed in the photo-elastic laboratory of Columbia University. Such a study has, in fact, been under way at Columbia for over a year, and other unexplored avenues of research in the photo-elastic field are opened up by the new apparatus, according to Raymond D. Mindlin of the department of civil engineering, who described it at the model study conference held at Cornell in connection with this year's meeting of the Society for the Promotion of Engineering Education.

The set-up for the welded joint study is indicated in the accompanying sketch. The chief characteristic of the new instrument is that the light, after passing through the usual arrangement of polarizing prism, retardation plate and model, is reflected directly back through the same system. The light, first being collected by lens 1, is converged to the center of a polarizing prism P-A after being reflected from the surface of a glass plate G. The diverging cone passes through a crystal retardation plate C and is rendered parallel by lens 2. After passing through the model the light is reflected and passes back in order through the model, lens 2, the retardation plate, the prism (now serving as an analyzer) and the glass plate G, and then strikes the screen or photographic plate. As shown, in making the model for the welded joints, spaces are left between the plates for the insertion of thin mirrors. The instrument is known as a reflection polariscope and produces fringe photographs just as does an ordinary polariscope, in spite of the fact that the same prism is used for polarizer and analyzer.



MODEL AND LAYOUT for analysis of nine welded lap plates with new reflection polariscope.

Professor Mindlin suggested that the instrument can be used for the study of stress distribution in the coverplates of girders. He also pointed out the applicability of the instrument to the determination of extreme fiber-stress distribution produced in a plate by forces applied at an angle to the plate, as suggested by the late Professor Mesnager. This suggestion was to coat a polished metal slab with a thin layer of transparent material, which becomes doubly refracting when strained. Bending the plate out of its plane would strain the coating, and the resulting double refraction could be measured by analyzing polarized light reflected by the metal surface. Many problems in the bending of plates and flat slabs could thus be analyzed with the reflection polariscope. The apparatus may also be used without modification in the interference method of determining the sum of the principal stresses, recently developed by Dr. V. Tesar in France and Dr. M. M. Frocht at the Carnegie Institute of Technology.

In addition to its applicability to these new problems, the instrument is believed to be worth consideration for ordinary photo-elastic work, since for a given load and thickness of model, double

the number of fringes is obtained (since the light passes through the model twice), and the length of the apparatus is about half that of the ordinary transmission polariscope, with a proportionate reduction in cost of the optical parts. A complete description of the reflection polariscope was published in the June, 1934, issue of the *Review of Scientific Instruments*, published by the American Institute of Physis, New York, N. Y.

Advice for Contractors Entering Government Work

III—Responsibility for Unforeseen Conditions

By Howard L. Jones
Cherrydale, Va.

Two previous articles have warned the contractor that bidding errors void no contract requirements and that contracting agents cannot modify law or contract

A VERY GREAT SOURCE of loss to those who contract with the government is a failure to determine definitely the exact nature of the work and the conditions under which it must be performed. In paragraph one of the standard instructions, bidders are advised to make their own estimates of the difficulties that may attend the execution of the proposed contract, including local conditions. It has been held that under this clause and in the absence of specific representations by the government, a contractor is not entitled to additional payment on account of the disclosure of unexpected subsurface or latent conditions.

If nothing is shown on the drawings or indicated in the specifications as to such conditions, the contractor is held not to have relied upon representations of the government. In the absence of representations the contractor must, at his own peril, determine for himself the subsurface and other conditions affecting the work. In a case in which the specifications stated that the soundings and borings made by the government could be used but that their use was at the bidders' risk, it was held that such provisions do not constitute a warranty on the part of the United States as to the character of the material to be encountered.

In one case the contract drawings indicated the foundations carried down to bedrock, as shown by borings previously made by another contractor. The bedrock was found several feet lower in some places. It was held that while the drawings gave the contractor such information as the government had as to the conditions, the general specifications advised that this information was not guaranteed and, therefore, there could be no allowance for extra work.

In the case of a claim for $10,000 for additional work it was held that by an express provision of the specifications the contractor was required to do all the work necessary to clear the site for the reception of the building. The contention of the contractor that it was misled by the blueprints was held to be wholly untenable. The object of the blueprints was held to be to show only the elevation and depression of the ground and not what might be on its surface in the way of rock. It was said that the government concealed nothing that would not have been easily visible if the contractor had visited the site of the work as he was directed to do.

In another case it was held that as the government officers apparently had no means of knowing and did not represent in the drawings or specifications the character of the bedrock to be found at the levels shown in the drawings, or that the bedrock at such levels would be suitable for the bearings of the foundations, the contractor was not entitled to additional payment for the extra work of excavating.

Allowable changes

The standard construction contract provides that the contracting officer may at any time, by written order, make changes in the drawings or specifications. If such changes cause an increase or decrease in the amount due, or in the time required for performance, an equitable adjustment will be made and the contract modified in writing accordingly. Any claim for an adjustment under this provision must be made within ten days from the date that the change is ordered unless the time is extended by the contracting officer. The contractor is not excused from proceeding with the work so changed.

Change orders may not be issued under a construction contract requiring the construction contractor to furnish and install certain items of equipment that are not items of construction. It is held that such equipment is for purchase after advertising in accordance with law. It was said also that changes should be kept at a minimum, as otherwise too great a portion of the work would not be subject to competition.

The decisions held that extra work necessitated by reason of the defective manner in which each contractor performed the work under contract or by an unauthorized deviation from the contract requirements does not entitle the contractor to extra compensation. On the other hand, where due to errors in the drawings and specifications, the contractor was required to remove materials largely in excess of the estimated quantity, the contractor is entitled to payment for the quantity actually dredged in excess of the estimated quantity at properly established rates.

The standard contract provides that no change involving an estimated increase or decrease of more than $500 shall be ordered unless approved in writing by the head of the department.

Increased costs

It has uniformly been held that the United States as a contractor is not responsible for its acts in its sovereign capacity. Where a contract has been entered into with the United States, at a fixed price, there is no authority to increase the price to be paid unless specifically provided therein or authorized in an act of Congress.

It has been said that claims based on theoretical increased costs due to interruption of work by reason of a change of plans, necessitating the removal of equipment and fabricating crews to another part of the job and back, do not embrace equities warranting a report to Congress.

In one case there was a claim against the government for $148,591, as extra cost due to delay in completing foundations. The advertised specifications specifically notified all concerned that the foundation sites carrying the work under contract were not completed, and furthermore that there might be delays. It was held that the obligation of the United States only extended to an extension of the contract time because of the delay. In a case in which the contractor was required to obtain permits and it became necessary for the government to obtain them it was held that there was no authority to reimburse the contractor in damages as the result of the delay in obtaining such permits.

It is a provision of the standard contract that, unless otherwise specifically provided in the contract, all disputes concerning questions of fact arising under the contract shall be decided by the contracting officer, subject to written appeal by the contractor within thirty days to the head of the department concerned, whose decision is final. Legal questions are for decision by the accounting officers and the courts.

Tidal River Silt Movements from Rotterdam to the Sea

Phenomena of the movement and settling of silt, formation of silt bars at and in the mouths of tidal rivers, and suggested means of maintaining ship channels there with a minimum of dredging

By Geert Blaauw
Millwood, N. Y.

NATURE, never very benevolent to Holland, did not equip that little nation with natural harbors or deep and easy estuaries. When ships were all of rather small dimensions, ports like Amsterdam and Rotterdam got along well enough with such waterways and harbors as nature had provided, but when, about 40 years ago, ocean ships began suddenly to increase to unheard-of dimensions, the city of Rotterdam realized the urgent necessity of providing for herself that which nature had so far withheld—a permanent deep channel to the sea.

Dredging proved futile

The river, or arm of a river on which Rotterdam is located, was then only 13 ft. deep at best, at Rotterdam harbor. (Although carrying mostly Rhine water, this river arm is called "De Maas"—pronounced Mars—and is really the Dutch name of the Meuse, which comes from Belgium. The name Ryn—Dutch for Rhine—is soon lost after the entrance of this German river into Holland.) As a consequence of the shallow depth, dredging was resorted to: first a channel was dug about 20 ft. deep, next this was deepened to 25 ft., then to 28 ft., and still later (ships continually increasing their depth below the water line) to 30 ft. Even that proved in the long run not deep enough. And at very few places did dredging give permanent results.

It appeared from the beginning that De Maas objected to this methodical deepening and permanency of regular channels; the river wanted its own natural regimen, especially near the mouth; it insisted on the regimen belonging to a silt-laden river—that is, a wide shallow shifting outlet with guts and mudflats, and the very thing that hampers navigation.

Dredging has naturally suggested itself as the most direct and effective method of deepening the channel; and so it was, for a while, but it did not prove permanent. For more permanent results, the river itself, the tides and if possible the coastal currents must be made to help in disposing of the bulk of the flocculated material. Without such help the task of dredging is almost endless and only of limited benefit and always too expensive. Dutch engineers have not been alone in finding this out: German and French engineers have had similar experiences. The French, for instance, found that the silt bars in the Gironde changed and that, after dredging at great expense about 1,000,000 cu.yd. of silt out of the Garonne, the riverbed had not materially changed. The river and the tides kept filling in almost as fast as the dredges removed the fill.

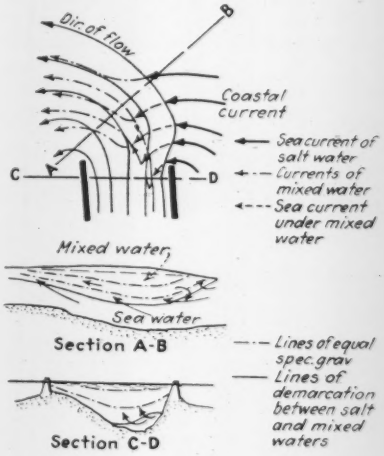


FIG. 1—MOUTH of waterway from Rotterdam, showing nature of currents in plan and section.

In the case of the "Maasmond" (Mouth of the Maas) it was observed that in some parts of the river a little below Rotterdam, sand contractors, dredging sand for building purposes, were in most cases able to keep on dredging year in and year out in a space of about 1,000 yd. up and downstream without going any deeper than at the beginning and without ever running out of sand. There, also, the river kept on filling in about as fast as it could be dredged out.

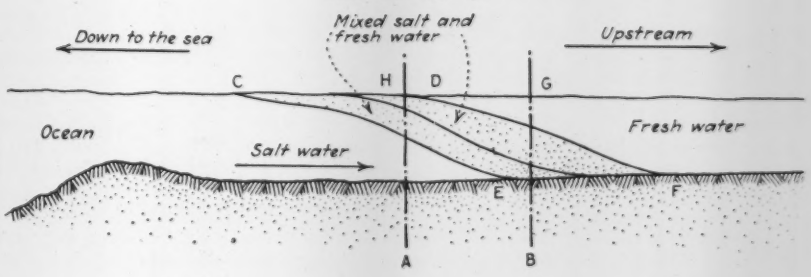
This and many other experiences, studies and observations proved that not enough was known about the internal processes and conditions by which this river brought so easily to naught all this human labor. Why this river would not or could not follow a ready-made deep channel was a puzzle and remained a puzzle so long as not all the internal actions, reactions and interactions of salt water, fresh water and brackish water, flocculation and cementation of materials in suspension, etc., were fully investigated and understood.

Silt-movement study begun

To Mr. J. J. C. Cremers, of the Institute of Engineers, Hague, Holland, fell the good luck and inspiring task of this first-hand research, and to my knowledge he patiently toiled at this, in the field as well as in the laboratory, office and study, for at least ten years. This was real labor, for there was no possibility of making a show of progress for years; but the study, with its multitudinous and varied observations and deductions, was made by Mr. Cremers with a care, minuteness, patience and perseverance seldom equaled.

It was found that, in the estuary of the Maas, the rate of flocculation of the material in suspension was controlled by the rate of mixing salt and fresh water in the flood basin. When silt-laden fresh water meets and mixes with salt (sea) water, it drops then and there the silt it has carried all along on its voyage to the sea. There is, of course, no sharp line of demarcation between the different kinds of water—salt, mixed and fresh, as shown in Fig. 2. If the different degrees of salinity did not make as many different degrees of specific gravity in the different layers of water, the mixed fresh and salt water might all be contained in a portion of the river as indicated by the rectangle *ABGH*, but the differences of specific gravities disturb this simple scheme altogether. The space occupied by the mixed waters is more nearly indicated by the space within *ECDF*. This space is the theater of struggle between salt and fresh water;

FIG. 2—ZONE OF CONTACT and intermingling of river and sea waters in Rotterdam waterway.



it is the place where flocculation of suspended matter attains its greatest rate.

During the incoming tide this theater of strife shifts a few miles upstream; during outgoing tide it travels a few miles more downstream, and in so doing the river manages to unload most of its mixed waters and some of its fresh waters into the sea. Note here "most of its mixed waters," not all; and "some of its fresh." This also mean that not all of the flocculated material of the mixed water has been unloaded. This is because the lower portion of the mixed water (sea area *CDFE* of Fig. 2) with its flocculated burden, by reason of the differences of specific gravity between the layers (salt sea water the heaviest), material just before carried out to sea is carried back by the undercurrent of the high tide, but this same high tide brings (in the case of the Maas at least) with it some fine sandy sea silt which the passing coastal current carries. Now that this sea silt is brought by the sea into contact with or is mixed with fresh water (river water), it also joins in the general process of flocculation going on there due to the presence of small quantities of calcium and magnesium salts in the fresh water. Moreover, even the material in colloidal or almost colloidal state in this coastal current grabs the opportunity to floc, thus helping to increase the burden of silt, ready to settle at the first opportunity.

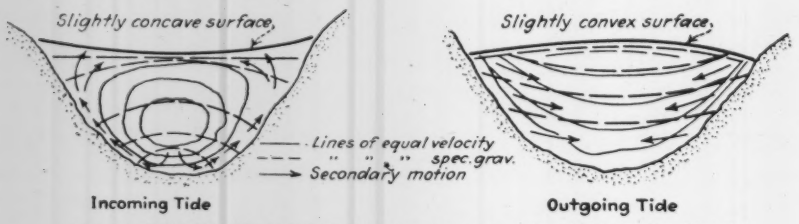


FIG. 3—CURRENT VELOCITIES and directions at outgoing and incoming tides for idealized cross-sections of Rotterdam waterway.

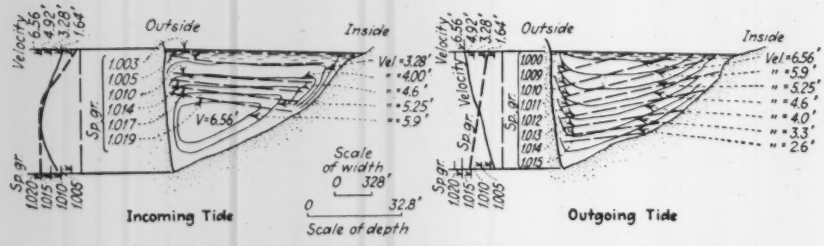


FIG. 4—CURRENT VELOCITIES and specific gravities at outgoing and incoming tides at actual section two miles from mouth of Rotterdam waterway.

is resisted without let-up and with more or less success, in its flow to the sea, by this heavier, salt sea water.

During high tide of course this wedge of salt sea water crowds back the residue of the mixed water of the last low tide, together with the newly-formed quantity, up the river for miles. There are even times when, helped by adverse high winds running against the river flow at low tide, the salt water keeps creeping upstream along the bottom of the channels, mixing more and more salt and fresh water, thus increasing the total mass of flocculated material. This material is ever-ready to drop, settle and stick where an opportunity offers; preferably in deep channels at a time of little commotion. Now nature conspires again against the works of man. It appears that silt of certain compositions, deposited with ease by the stream when flowing in one direction, cannot be so easily dislodged by that same stream when flowing in the opposite direction, even when the latter is of greater flow intensity.

There is a reason for this. With the incoming tide, not only a great deal of

To make matters worse, when silt is thus composed of some sand, a certain amount of clay, and, for good measure, a fair amount of flocculated colloidal ooze, this clay and ooze, when settling down with sand, take their natural place in between the grains of sand and fill up the interstices. This combination is ideal for making sand banks solid enough to resist a little wave wash or tidal current, because it prevents internal water currents from dislodging the separate sand grains, as is possible with sand alone. Most active rivers usually carry plenty of clayey material with them, ready to perform this cementing service when an opportunity offers. Most tidal rivers are thus enabled to form sand banks even unaided by any flocculated colloidal material from the sea, but this helps; it helps in perfecting the making of "zandplaten" (Dutch name for very smooth and solid sand banks under water). From all this it appears that a silt bed in an estuary made thus by the outgoing tide in a deep channel is more difficult to dislodge than the more sandy deposits made by the incoming tides outside these deep channels.

Why the outgoing tide should preferably deposit this hard-to-dislodge material in the deep channels, while the incoming tide deposits it more often outside such channels, becomes evident by studying Fig. 3, which shows general conditions actually observed.

In the region of the mixed waters the current of the river, during incoming tide, is slower at the surface than at the bottom, but during the outgoing tide the upper current is more powerful than the ground or under current. These phenomena, in their varying degrees of intensity and direction, all play their part in the final disposition of the silt. In the main, the general tendency is: for the incoming tide to concentrate its scouring force at the bottom of deep channels, throwing the scoured material up on the shallow places; and for the outgoing tide to spread out over the whole width of the river, tending to shovel back the material scoured up by the incoming tide just before. (See Figs. 3 and 4, all showing actual observations.)

In general, the outgoing tide has the advantage in this back-and-forth shoveling act, because it carries with it more stuff in suspension, or in flocculated form, ready to drop at the first opportunity; furthermore, a great part of this material is clayey, which helps the cementing process along and, when mixed with salt sea water, it is capable of adding to its load of floccules the fine sea sand and also some of the colloidal matter of the sea water. All of which furthers the process of cementing the material deposited by the outgoing tidewaters.

Besides this main battle up and downstream, in which the flocculated and flocculating solids (always ready to settle at the first opportunity) are dragged back and forth, secondary engagements are taking place in varying directions in different parts of the river, mostly actuated by the differences of specific gravity of the different layers of salt, mixed and soft water. Figs. 3 and 4 bring this out clearly.

A study of Figs. 3 and 4 reveals that the relative intensities of currents are quite different from those that we are accustomed to meet in cross-sections of streams with water of the same specific gravity throughout. It appears also that the retarding action of friction along the bottom and sides of the riverbed does not count for much in these cases here.

Discussion of a remedy

Returning to Fig. 1, this sketch is of interest in showing the complex motions of the different kinds of water: salt, mixed and fresh, at and around the mouth of the Maas. The phenomena shown there suggest the possibility of carrying the anti-silt fight to the sea; the farther into the sea, the better.

Fig. 5 shows the work done by some dredging, but mostly by spur dikes, which, after considerable experimentation, have now become a success, obviating an enormous amount of ceaseless

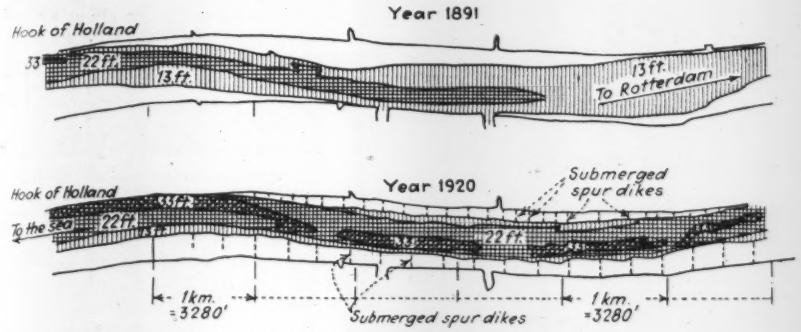


FIG. 5—EFFECT OF SPUR DIKES in improving channel depth in Rotterdam waterway.

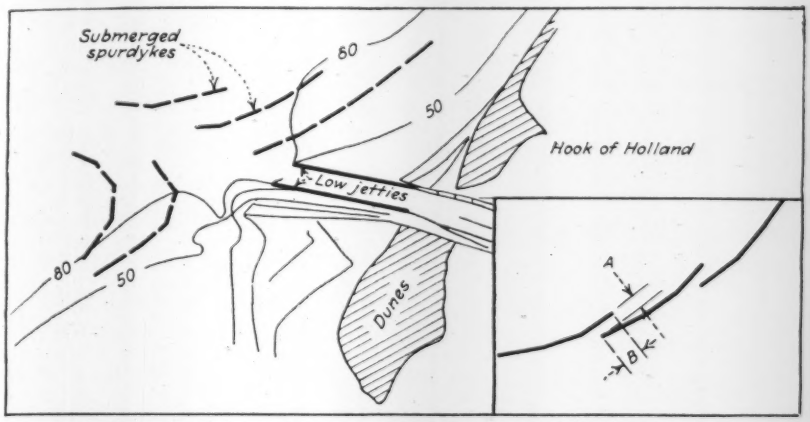


FIG. 6—SUBMERGED DIKES suggested to utilize coastal currents in drawing waterway silt out to sea.

dredging. The normalization of this stream by submerged spurs, besides confining the river to the ship channel and preventing it from meandering, has the effect of accelerating the motion of the ambulant mass of mixed salt and fresh water with its burden of matter in suspension. This also affords, at times of lower tides, permanent disgorgement of these masses into the deep sea; it has not, so far, prevented some incoming tides from dragging back and depositing in the mouth of the Maasmond and in the neighborhood of the Hook, a considerable quantity of silt (about 1,000 cu.yd. a day under unfavorable conditions of tides and winds).

The salient features and observations of Mr. Cremers' work have been summarized in this article. From his observations many valuable deductions have already been made, which when applied have proved of great practical and economic value. With the customary circumspection always expected from any engineer, I venture to suggest that still greater use may be made of his work, especially in regard to the utilization of coastal currents that often run at right angles in the neighborhood of estuaries during the change of the tides. With the proper type, size, dimension and location of spurs and similar contrivances, it would seem possible that such currents might be made to help instead of to hinder in the effective disposal of that mass of flocculated and flocculating matter which travels now usually back and forth, ready to settle in all kinds of places where it is least wanted. This might be done by training these current-deflecting devices to deflect and carry off far into the sea the cloud-like masses of silt and sand, thus preventing their unwelcome return at high tide (see Fig. 1).

In the case of the "Maasmond," a strong coastal current runs, during low tide, at right angles to the mouth of the stream of outgoing river water. It is proposed to give these currents an injector action by submerged dikes, as shown in Fig. 6 First of all, the whereabouts and the travels of the cloud of flocculated material should be ascertained under all sorts of tides and weather conditions, in order to choose the best location for the submerged spurs. By means of smaller-scale models actual conditions might be simulated and experimentally some of the spurs put in the model as well as in the sea.

The actual design of the spurs might be as shown at Fig. 9A—that is, open—and distances A and B experimentally determined.

Estuaries of this kind will, if no use is made of artificial restrictions for guidance in predetermined channels, return after the most extensive dredging operations to their natural regimen—that is, to a fan shape with many shifting channels to a depth corresponding to the ability or capacity of the salt-water currents to dislodge the cemented silt deposited by the outgoing tide. Much has been done up to now, in respect to providing navigation with safer, deeper and more permanent ship channels through similar estuaries; yet, in the final solution of the problem of how to prevent the high tides from backing up from time to time into these navigation channels thousands upon thousands of cubic yards of silt, no determined attempt has been made to use the cross-coastal currents which at all estuaries are present during the changes of tides. To invoke successfully that yet-untouched force of nature to do useful work looks certainly very tempting.

Flood Protection Scheduled to Start in Los Angeles Foothill Area

MEASURES to effect partial flood protection in the Montrose-La Crescenta areas of Los Angeles, during winter rains have been assured by the county board of supervisors with the appropriation of $250,000 for construction of four debris basins and the clearing of channels below them in the foothill area. Construction of additional protective works by the county flood-control district was to depend upon the passage of a proposed $26,332,500 flood-control bond issue at the Nov. 6 election. About $4,000,000 of the proposed issue would be utilized for work in the Montrose-La Crescenta area. Announcement that a loan of $1,000,000 by the RFC is available to the flood-control district, through the Disaster Relief Corporation of Los Angeles, providing flood-control district bonds are presented as security, was made in Los Angeles Oct. 22.

An emergency program designed to protect lives and property in event of rains of flood proportions during the winter season has been outlined by S. M. Fisher, chief engineer of the flood-control district. Under the plan, the county is divided into six divisions, each to be under the direction of an engineer who will be in charge of emergency operations. The engineers will have headquarters where they can be reached quickly by citizens in the divisions, will be in direct communication with the headquarters office and will have the authority to hire men and equipment.

The division engineers include William Faint, M. C. Tobin, T. R. Mini, Neil Thom, F. C. Lee and W. W. Tincher.

Sludge Gas at Toledo Plant Could Operate Pumping Station

Observations on production of gas by digestion of sludge show that more than 2,000,000 kw.-hr. could be generated annually

By A. H. Niles
Superintendent, Sewage-Treatment Works, Toledo, Ohio

THE PROBLEM of economical utilization of our sewage sludge gas was one in which the writer interested himself immediately after the Toledo sewage-treatment plant was placed in operation. Data obtained during the year 1933 lead to the conclusion that the heat value of the gas produced could be utilized to produce sufficient power to operate the sewage pumping station and the treatment plant proper.

In the treatment works as designed and constructed, no provision was made for the utilization of the gas other than to heat the digesters and the buildings of the treatment works, on account of incomplete plans of the city administration for the establishment of a new garbage incinerator plant somewhere near the sewage-treatment works. It was felt that the excess gas could be used profitably for that purpose, should the garbage incinerator plant be built within economical piping distance.

The writer, however, was attracted to the possibilities of generating all the electric current used at the Bay View Park sewage pumping station located adjacent to the sewage-treatment works, and the current used for the treatment works itself. This sewage pumping station pumps about 90 per cent of the total flow through the treatment works, and the electric bill amounts to about $[illegible] per year.

However, as an immediate use of the extra gas, we equipped the coal-fired steam boiler used to heat the pumping station with a bunsen type of burner. This was installed complete for $200 and eliminated the purchase of 100 tons of coal formerly purchased at about $5 a ton to heat the pumping station. This installation of course paid for itself about twice the first winter used, 1932 and 1933. From the table given below it may be seen that in 1933 gas was collected from the digesters in excess of 67,000,000 cu.ft. Of this amount approximately 12,000,000 cu.ft. were used each in heating the buildings on the island where the pumping station and the sewage-treatment works are located and for heating the digesters themselves. It is also to be noted that more than 43,000,000 cu.ft. were wasted. This wasted gas was burned in an open flare to avoid any possible odor from that source.

Our gas from analysis shows an average low or net heat value of approximately 650 B.t.u. per cubic foot.

By using figures presented by W. B. Walraven, district engineer, Sanitary District of Springfield, Ill., and also those provided by gas-engine manufacturers, we established the basic figure of 1 hp.-hr. from 10,000 B.t.u. of gas. Therefore it would take about 15.4 cu.ft. of our 650-B.t.u. gas to produce 1 b.hp.-hr., or 20.6 cu.ft. to produce 1 kw.-hr. with 100 per cent efficiency. We assumed a 20 per cent loss due to generator, load factor of rated capacity of gas engines, and other minor losses. This, then, figures 25.75 cu.ft. of gas per kw.-hr. on the switchboard.

We read all meters, both electric and gas, each 8 hours. The current requirements were balanced against the number of kilowatt-hours that our gas "available for power" would produce. Any excess or deficiency in gas over the requirements for power was reduced back into cubic feet, which would be either wasted or used to fill the required gas holder or withdrawn from the holder. This fixed the size of the holder at about 200,000-cu.ft. capacity.

By "gas available for power" is meant the sum of gas wasted plus the gas used to heat the digesters, since it is planned to heat the digesters from the jacket or cooling water from the gas engines. It was expected that the buildings would continue to be heated with gas, but from more recent computations it looks possible to use all gas collected for power, if necessary, and heat the buildings from steam generated from the exhaust gases. This would give us a still greater amount of power and will probably reduce the size of holder required. The last column of Table II shows the number of kilowatt hours that could be produced from the total gas collected. This assumes that current could be supplied for other city requirements when available.

TABLE I—GAS PRODUCED AND UTILIZED DURING 1933

Month	Total Gas Made, Cu.Ft.	Gas to Heat Bldgs., Etc., Cu.Ft.	Gas to Heat Digesters, Cu.Ft.	Gas Wasted, Cu.Ft.	Aver. Temp. Digesters, Deg. F.
Jan.	5,960,400	1,732,200	1,351,000	2,877,200	82
Feb.	7,350,300	1,726,900	1,981,600	3,641,800	82
Mar.	5,815,500	1,778,400	1,959,100	2,078,000	82
Apr.	5,360,700	1,362,400	1,624,300	2,374,000	86
May	4,661,200	678,900	12,000	3,970,300	85
June	5,148,400	152,900	549,600	4,444,100	82
July	5,288,000	82,000	691,900	4,514,100	83
Aug.	5,104,400	132,200	623,600	4,348,600	84
Sept.	6,224,300	309,500	801,200	5,113,600	85
Oct.	5,329,300	973,000	706,500	3,649,800	85
Nov.	5,547,400	1,483,500	936,700	3,127,200	83
Dec.	5,911,900	1,723,600	1,170,500	3,017,800	84
Total	67,701,800	12,135,500	12,408,000	43,156,500	—
Aver.	5,641,800	1,011,300	1,034,000	3,598,375	84

TABLE II—POWER AVAILABLE FROM SLUDGE GAS

Month	Total Power Used, Kw.-Hr.	Cost	Power Avail. Would Produce, Kw.-Hr.	Power from All Gas Collected, Kw.-Hr.
Jan.	142,080	$1,661.25	164,115	231,000
Feb.	126,720	1,536.49	218,373	285,500
Mar.	161,920	1,833.26	156,764	225,800
Apr.	150,400	1,739.34	150,251	208,000
May	162,560	2,056.37	153,811	181,000
June	135,680	1,706.87	193,921	199,600
July	121,600	1,523.75	202,168	205,100
Aug.	118,400	1,642.70	193,088	198,400
Sept.	120,960	1,584.39	229,699	241,800
Oct.	101,760	1,322.22	169,252	206,800
Nov.	94,080	1,278.31	157,816	215,100
Dec.	107,520	1,373.09	162,743	229,000
Total	1,543,680	$19,258.54	2,042,001	2,627,100

GLASS-ENCLOSED sludge-drying beds at Toledo.

Sewage Plant Survey—IX

Data from Toledo, Ohio

THE FOLLOWING ARTICLE is the ninth of a series presenting in brief form the salient design and performance characteristics of American sewage plants. Articles already published have presented data from the following cities: Decatur, Ill.; Cleveland, Ohio; Schenectady, N. Y.; Aurora, Ill.; Lima, Ohio; Grand Rapids, Mich.; Urbana, Ill.; and Baltimore, Md.

PRIMARY TREATMENT only, consisting essentially of plain sedimentation, reduced the B.O.D. of the sewage of Toledo, Ohio, from 185 to 115 p.p.m. as an average for 1933. Detailed operating data for the year are given in the accompanying tables.

Sewage in Toledo is collected by a combined sewer system. The treatment plant, which was put into operation on June 8, 1932, comprises coarse screens, mechanically cleaned grit chambers, primary sedimentation tanks provided with mechanical sludge-concentrating equipment, separate heated sludge-digestion tanks and glass-covered sludge-drying beds (See *ENR*, March 5, 1931, p. 389). After treatment the sewage is discharged into Maumee Bay, an arm of Lake Erie. The plant was designed by H. P. Jones & Co., to care for an ultimate population of 600,000, predicted for 1950. The cost of construction was about $2,000,000, exclusive of the cost of two sewage pumping stations.

The 29.5 m.g.d. average flow reported in the accompanying table is made up of 26.9 m.g.d. from the west side of the city, which obtained during the entire year of report, and 2.6 m.g.d. from the east side, from which sewage first came to the plant on July 10, 1933. Likewise the 52.7 m.g.d. maximum-day flow figure is made up of 46.9 m.g.d. and 5.9 m.g.d. from west and east side respectively. Flow figures were determined by venturi meters.

Analytical results are based on 24-hour composites of hourly samples.

The information from which this article was prepared was furnished by A. H. Niles, plant superintendent.

Mr. Niles furnishes also the following additional information in regard to supernatant liquor from the digestion tanks:

"Considerable criticism has been aimed at separate sludge digestion because of supernatant liquor from digesters being returned to primary settling tanks. About the middle of last March we inaugurated a plan of operation such that little if any supernatant liquor from the digesters was returned to the clarifiers.

"The plan involved the pumping of raw sludge from the clarifiers into the digesters only as digested sludge was being pumped to the sludge drying beds. This of course meant that the raw sludge had to be held in the clarifiers as a sludge blanket for one to two days, depending upon the frequency with which beds could be emptied for the digested sludge being pumped to them from the digesters.

"Small amounts of raw sludge were pumped into the digesters at other times, but only enough to make up for the shrinkage in volume of the raw sludge during digestion.

"This practice was kept up until September, when sludge no longer dried rapidly enough to allow us to operate as above described. We then returned to the normal operating practice of pumping raw sludge to the digesters when it accumulated in the clarifiers and allowed the supernatant liquor to return to the clarifiers.

"From the table given below the results of the method of operation can be very readily seen by the per cent reduction of B.O.D., suspended solids and settleable solids.

"The writer believes that where vacuum filtration of digested sludge is installed or where drying conditions are ideal together with sufficient drying area it would be possible to operate with very little supernatant liquor returned to the primary tanks."

EFFECT ON PLANT PERFORMANCE OF AVOIDING THE RETURN OF SLUDGE LIQUOR TO SEDIMENTATION TANKS

Month	Suspended Solids, P.P.M.			Bio-Chemical Oxygen Demand, P.P.M.			Settleable Solids, % Reduction
	Influent	Effluent	Per Cent Reduction	Influent	Effluent	Per Cent Reduction	
Jan.	204	87	57.3	144	81	37.0	94.2
Feb.	181	106	41.4	134	94	30.0	92.5
Mar.	155	79	49.0	112	74	34.0	96.7
Apr.	139	59	57.5	99	57	42.4	98.8
May	140	55	60.7	96	57	40.6	97.6
June	203	82	59.6	207	122	40.8	98.2
July	214	87	59.4	201	113	43.7	98.2
Aug.	306	91	70.2	217	119	44.9	97.9
Sept.	221	102	53.8	216	141	34.5	95.3
Oct.	224	89	60.3	238	158	33.3	94.9
Nov.	284	109	61.6	268	175	34.5	95.3
Dec.	340	131	61.3	278	183	34.2	90.0
Aver.	218	90	58.7	184	114	37.8	95.8

SEWAGE-PLANT PERFORMANCE DATA, TOLEDO, OHIO

GENERAL DATA

Population, 1930	290,000
Population served, 1933	275,000
Rated capacity of plant, m.g.d. average dry weather	80
Sewage flow	
Average m.g.d.	29.5
Maximum day, m.g.d.	52.7

SEWAGE-TREATMENT UNITS

Coarse Screens

Number of units	2
Width of opening, in.	½
Method of cleaning	Automatic
Submerged area of screen, vertical projection, each unit, sq.ft.	51.6
Angle of screen with horizontal, deg.	59

Grit Chambers

Number of units	2
Plan dimensions, each unit, ft.	40x40
Operating depth, including grit space, ft.	2.55
Method of cleaning	revolving scrapers
Frequency of cleaning	continuous during storm

Primary Sedimentation Tanks

Number of units	8
Plan dimensions, each unit, ft.	90x90
Operating depth at side, ft.	10
Provisions for sludge removal	revolving scrapers
Frequency of operation	continuous
Sewage flow, each unit, m.g.d.	3.4
Detention period at maximum flow, each unit, hr.	3.2

SLUDGE DISPOSAL

Sludge Digestion Tanks

Number of units	8
Diameter, ft.	85
Depth at side, ft.	29
Capacity, each unit, cu.ft.	167,500
Number of units used at present	4
Capacity actually used, each unit, cu.ft.	150,000
Temperature maintained, deg. F.	82–86

Sludge-Drying Beds

Number of units	48
Length, each unit, ft.	162
Width, each unit, ft.	20
Depth of sand, in.	6
Depth of sludge applied, in.	8–12

ANALYTICAL RESULTS

	Settleable Solids (2 hr.), c.c. per Liter	Suspended Solids, p.p.m.	Total Solids, p.p.m.	Five-Day B.O.D. p.p.m.
Raw sewage	3.6	218	891	185
Settling-tank effluent	0.2	93	750	115

SCREENINGS, GRIT AND SLUDGE

	Volume, Cu.Ft. Per M.G.	Dry Solids, Per Cent	Volatile Solids, Per Cent	pH	Disposal
Screenings	1.9	...	...	...	Burial.
Grit	1.5	varies	40.8	...	Fill.
Settling-tank sludge	330	7.0	62.8	7.4	To digestion tanks.
Digested sludge	120	8.0	44.8	6.4	To drying beds.
Dried sludge	31	30–60	....	...	Used as fertilizer.

Welding and X-Raying the Boulder Dam Penstocks

With fabrication of 45,000 tons of penstock steel half completed, excellent results are reported for both welding and x-raying—Steps in the process described

FIG. 1—FABRICATION of the 45,000 tons of steel into welded pipe is done at this plant located 1½ miles from the dam site.

MORE THAN 50 per cent of the penstock pipe to serve the power houses being built in conjunction with the Boulder Dam project has been fabricated. The method used is the automatic electric-fusion welding of plates, the thickness of which range from ⅝ in. up to 2¾ inches, and the entire 400,000-ft. length of welded joints is to be x-rayed so that any injurious defects can be located and repaired. Reports on both welding and x-raying are highly satisfactory.

The contractor's plant for fabricating the Boulder Dam penstocks is located as close to the narrow canyon as feasible, because more than 12,000 lin.ft. of the penstock pipe ranges in diameter from 13 to 30 ft., and sections of the largest size weigh about 170 tons each. These sizes and weights made it impracticable to fabricate these pipe sections at a distance, and a plant was therefore established in the desert about 1½ miles from the power-house site (Fig. 1). The following includes notes on observations made and experience gained during the first half of the work and supplements a previous more general article covering penstock fabrication (*ENR*, Dec. 21, 1933, p. 751).

The steel plates from which the penstocks are being made are rolled in the East and shipped as flats to the fabricating plant at the site. Much of the equipment in the fabricating plant had to be designed specially for this job because of the large sizes and weights of the pipe sections (Table I).

Work in the fabrication plant begins with laying out and torch-cutting the individual plates, followed by planing the edges to form suitable welding grooves. A specially built 40-ft. planer with pneumatic clamps for holding the plates has been provided for this purpose. From this machine overhead cranes move the plates to a 3,000-ton hydraulic press that bends the plate edges to the required shape. The plates are then curved into circular shape in vertical bending rolls 12½ ft. high.

Welding procedure

After adjacent edges are tack-welded to hold the plates practically circular in shape, the longitudinal welds are made by automatic electric welding machines (Fig. 2). To complete a joint in the heaviest plate, as many as 25 beads may be necessary. The electrodes are covered with a mineral-base flux, the function of which is to protect the fused metal from atmospheric contamination while the weld is being made and to form a slag that carries off impurities. The nitrogen content of the weld metal is thus kept to a minimum. Excessive brittleness would be expected if the nitrogen content were too high as a result of air having free access to the molten metal as it is deposited.

The unit of pipe for installation purposes is the erection section, which, in the case of the 30-ft. diameter pipe, is composed essentially of two pipes, each 12 ft. long, between which is welded a fillet insert or stiffener ring. An annular buttstrap is shrunk on and welded to one end of the erection section, to form the bell end of a bell-and-spigot joint by which adjacent erection sections are united by cold-pinning after they are installed in the tunnel. All welding is required to conform to the rules of the A.S.M.E. boiler code covering the fusion-welding of Class 1 unfired pressure vessels.

Test specimens

Recognizing the desirability of making physical tests on samples of the welds in each section of pipe, and at the same time considering the impracticability of cutting test specimens out of completed welds, a plan was adopted that makes it possible to get the desired samples from each weld without damaging the pipe. This is done by welding test plates to the end of each pipe section in such a position that they constitute a continuation of the groove in which the longitudinal weld is made.

These test plates consist of two pieces, each 8x16 in. in size, of similar material and the same thickness as the plates used in the sections; they are planed in such a way that they have exactly the same shape and size of groove as the large plates. After the weld has been completed, the test plates (now joined by a weld in every respect the same as, and in fact a part of, the main longitudinal weld) are subjected to the same stress-relieving treatment as the pipe, flame-cut from the pipe, and delivered to the laboratory. They are identified by markings that agree with those on

TABLE I—WEIGHTS AND DIMENSIONS OF PENSTOCK PIPE

Diameter, Ft.	Total Length, Ft.	Maximum Length per Section*, Ft.	Number of Plates per Ring	Maximum Weight per Section, Tons	Plate Thickness, In.
8½	2,300	38	one	20	⅝ to ¾
13	5,600	40	one	40	1⅛ to 1 ⅜
25	1,900	24	three	125	1⅝ to 2 1/16
30	4,700	24	three	175	1 11/16 to 2¼
Total	14,500				

*Length delivered as one piece from fabricating plant.

TABLE II—PROPERTIES OF WELD METAL IN SPECIMENS FROM TEST PLATES

	Tension Tests				
	Yield Strength, Lb. Per Sq.In. (38,000 required)	Ultimate Strength, Lb. Per Sq.In.	Minimum Elongation, Per Cent (20 required)	Area Reduction, Per Cent	Minimum Spec. Gravity (7.80 required
Parallel to weld	52,500	68,000	24	35	7.81
Traverse to weld	45,000	68,000	Not recorded		

Cold Bending Test:

Bending transverse to weld shows 35 per cent elongation in 1 in. on outside fiber (minimum required, 30 per cent).

FIG. 2—GANTRY-MOUNTED, automatic welding machine at work on a girth joint of a 13-ft. diameter section. The pipe revolves under the welding machine.

FIG. 3—HEAVY SPIDERS are required to hold the pipe in shape during assembly and welding. This bend section of 30-ft. diameter is completed, and the far edge is being faced by a special lathe.

the section from which they are taken.

In the laboratory these specimens are tested for (1) density of weld metal, (2) cold bending transverse to weld, (3) yield strength and tensile strength transverse to weld, and (4) yield strength, tensile strength and ductility longitudinal to weld. In this latter test the specimen is machined from the test plate in such a way that the test specimen consists entirely of metal deposited during the welding process, and is of such shape that tension can be applied in the direction of the weld. The tension tests (Table II) are made to destruction, of course, the yield-strength requirements being the same as those which the specifications impose upon the base metal in the steel plates used to make the pipe.

Various forms of spiders (Fig. 3) are used in the assembly and welding process. Even for pipe of the largest diameter, some end spiders are merely tension rods consisting of six spokes, each with a turnbuckle, radiating from a central plate to which all the rods are bolted. Others consist of radial arms made up of heavy steel H-sections with jacks on their outer ends for exerting an outward thrust on the inside of the pipe. In some sections a combination of tension and thrust is desired, and spiders accordingly are made up of both tension and compression members.

With adjacent circumferences in match, two pipe rings are spot-welded together so that both can be revolved as a unit. Automatic welding machines then are set up for operation in a stationary position over the joint while the entire pipe section is rotated slowly as the two sections are welded together.

The x-ray method of testing the welds was selected in preference to the gamma-ray method, which has been used on other jobs, because x-rays afford greater economy, greater speed and better contrast on the films. In this connection, engineers for the Bureau of Reclamation point out that gamma-ray testing is preferred for sections exceeding 3½ in. in thickness and for field use where it is impossible to transport x-ray equipment to the job.

X-ray machines

The machines used (Fig. 4) for the x-ray exposures operate at 300,000 volts and with a current of 10 milliamperes. Of two of these in use by the contractor, one is moved about the plant by hand, and the other is mounted on a gas-electric self-propelled truck.

These machines, valued at about $20,000 each, have special design features, because apparatus so delicate as the high-voltage tubes used in this work (the tubes being valued at about $500 each) require sturdy mounting and ample protection, in order that they can be operated with safety for long periods in such a plant. The high-voltage tubes, about 5 in. in diameter by 55 in. long, are therefore immersed in oil, and the oil tank is sheathed with lead. After a year of operation (welding started in April, 1933), one of the machines was using its fourth tube, while the other was using its second.

With these machines, the average exposure time for steel 2 in. thick is about 8 min. The curve for time of exposure rises very sharply as metal thickness increases beyond 2 in. and, for thicknesses up to 3½ in. that have been radiographed as part of the regular inspection procedure, exposures of 20 to 30 min. have been required.

Making the radiographs

The procedure in making the radiographs is as follows: (1) The weld to be inspected is laid off into lengths not exceeding 30 in. each, and each length is identified with lead numbers placed so that they will show on each 30-in. film. (2) The x-ray machine then is brought into position, and the shielded cone of rays is directed toward the portion of the weld to be examined. (3) A film holder is placed on the inside of the pipe exactly opposite the cone from the x-ray tube. (4) An exposure of the proper length is made. This procedure is then followed on the remainder of the weld. The maximum rate at which these radiographs can be made so greatly exceeds the capacity of the plant in making the electric welds that the x-ray work never needs to be hurried.

The men engaged in this work are given periodical medical examinations, and their daily assignments are rotated so that they will not perform the same operations continuously. Periodic tests of the equipment in the shop also are made with a view to detecting any effect of stray rays. Development and examination of the films require less

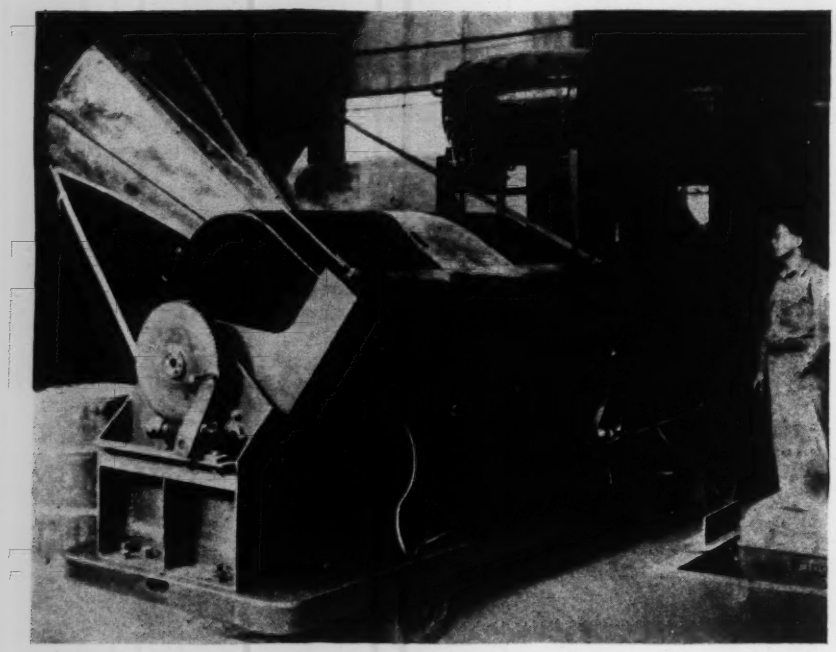


FIG. 4—X-RAY MACHINES radiograph all of the 400,000 lin.-ft. of welds. Average exposure time for a 2-in. thickness of steel is 8 min. The machine uses a 30-in. length of film.

than half an hour, which means that when necessary the welds can be approved shortly after completion.

Weld defects ordinarily are divided into four classes: (1) slag inclusions, (2) porosity, (3) incomplete fusion and (4) shrinkage cracks. With the x-ray inspection methods it is stated that defects of a size greater than 2 per cent of the thickness of a plate are accurately located and recorded.

Slag inclusions are permissible if their length does not exceed one-third the thickness of the joint and providing any two adjacent inclusions are separated by solid weld metal equal to twice the plate thickness, and further provided that such defects do not average more than one per foot for any one joint. Slag inclusions not meeting these conditions are removed and the section rewelded.

The judgment as to acceptable and unacceptable porosity is based on comparison of the radiographs of the welded seams with standard A.S.M.E. boiler code radiographs. When cracks and incomplete fusion are detected, they always are remedied regardness of how slight they may appear to be. Hence, there is considerable advantage in knowing which surface is nearer to the flaw that must be removed. Experience in examining radiographs develops facility in judging whether the defect is nearer one face of the plate than the other. After the faulty metal has ben removed, the seam is repaired by electric fusion welding, the metal being placed by manual welding instead of by automatic machine. The renewed portion of the weld is x-rayed again, to make sure that the new weld is wholly satisfactory, and that the defect shown by the original x-ray has been remedied.

A part of the work of keeping the radiograph records is the tracing on transparent paper of any defects important enough to warrant further attention. These tracings show the welded area, the nature and size of the defects and the identifying marks that will enable the shop foreman to mark on the steel the exact location of the defect to be remedied.

Each welder is required to put his identification symbol on every weld he makes, and a continuous record is kept of the percentages of defects chargeable to each welder. However, it is not the custom on this job to require each welder to do such rewelding as may become necessary on his work. With the automatic machines and where seasoned experienced welders are employed, it has been found that the personal element is a minor factor so that no penalty for defects is imposed. Moreover, the repair work is a job for specialists, and it is considered inadvisable to interrupt the regular welding schedule to give attention to rewelds.

After completion of all operations in the welding shop, including approval of x-rays on any rewelds, each pipe section is treated in the annealing furnace (Fig. 5), to relieve any internal stresses set up in the plate-rolling or welding operations. This furnace is a brick-lined room that can be heated to the required temperature. The stress-relieving temperature is maintained for a given period per inch of thickness of the heaviest plate in the sections undergoing treatment. Four thermocouples for measuring the temperature have been placed at convenient locations in the furnace, and soaking temperatures are recorded at 15-min. intervals and at 30-min. intervals when heating. In addition, an automatic recording pyrometer registers the temperature of the ingoing gases. The direction of the ingoing gases is reversed frequently enough to obtain uniform heating of pipe sections of the various sizes.

Field work on the penstock contract is under the general direction of Walker R. Young, construction engineer, U. S. Bureau of Reclamation; G. L. Yetter is welding engineer for the Bureau. The $11,000,000 contract for fabricating and installing the penstocks is held by the Babcock & Wilcox Co. R. S. Campbell is project superintendent and B. T. Kehoe plant superintendent at the Boulder plant for the Babcock & Wilcox Co. The plates are being rolled by the Illinois Steel Co. at Gary, Ind.

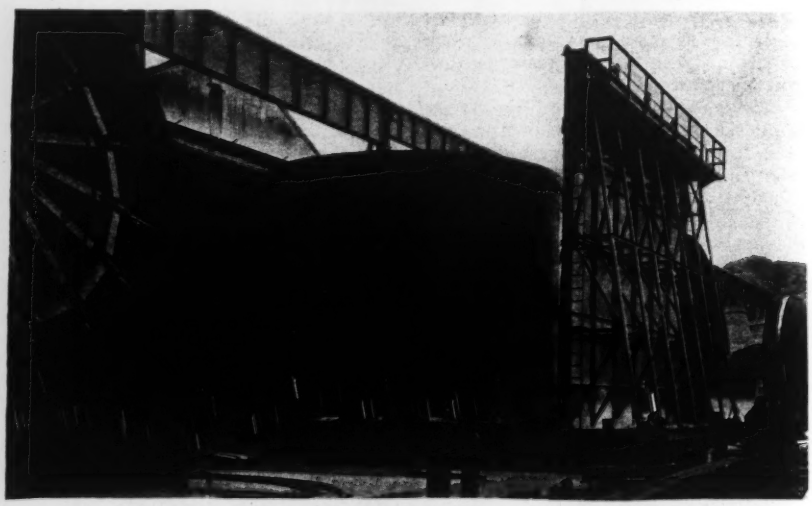


FIG. 5—STRESS RELIEVING is done in a large furnace in which the floor and front wall move out, as shown, to receive sections of pipe placed by overhead cranes.

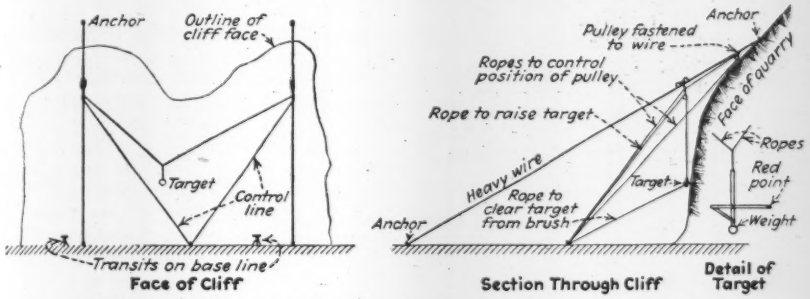
Topography of High Cliff by Unique Survey Method

By Daniel McFarland
Arcadia, Calif.

THE NECESSITY for making an accurate topographic survey of a 300-ft. cliff at the site of the quarry being developed for the San Gabriel Dam No. 1 of the Los Angeles Flood Control District resulted in the development of an unusual method. By the use of a target moved over the face of the cliff by a system of ropes and observed by instruments, the survey was conducted without the need for lowering men in slings over the face of the cliff.

The quarry site that has been opened up to provide the rockfill for San Gabriel Dam No. 1 included a cliff which rose steeply for 300 ft. and then broke back on a slope of about 45 deg. The contract specifications contained a separate item for quarry stripping, which made it necessary to have an accurate survey of the quarry site, including the face of the cliff. Because of the height and the condition of the rock, it would have been very difficult and dangerous to have men working on this surface.

The problem was solved in the following manner: Three No. 6 steel wires were stretched from top to face of the quarry face and anchored. One wire was located at the ends of the site and one near the center. On each of these wires a small pulley, serving as a trolley, was attached in such a manner that it could be pulled up and down the wire. A weighted timber target was suspended from ropes leading over two of these trolleys. By adjusting these control ropes the target could be moved along the face of the cliff. A third rope was provided as a tail line attached to the end of the target, which was used to pull it out from the cliff as required to avoid brush and to eliminate the need for moving the position of the trolleys on the wires. The general arrangement of this system is shown in the accompanying sketches.



SYSTEM OF WIRES AND ROPES used to maneuver target over cliff face for a topographic survey.

The observations on the target were made from two transits set up on a base line at the bottom of the cliff, and a level was set up on the hillside opposite the face. Contours were taken at 5-ft. intervals. The levelman first set up his level within 0.1 ft. of the exact contour. Then, starting at one end of the face, the target was worked along the face of the cliff by the system of ropes, stopping it for observations at each break in the contour line.

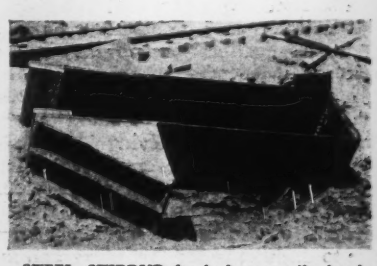
The target was manipulated to the right elevation, as directed by the levelman, and then the two transitmen were sighted at the end of the target next to the rock. This procedure was followed until the target reached the center wire, where the line from the first wire was disconnected and one from the third wire on the opposite end of the quarry face was attached. In the meantime the two transitmen moved to a new position on the base line and the observations along that contour line were completed. This procedure was repeated along the other contour lines. A field telephone was installed to enable the transitmen to check their readings, to make sure that they were numbered correctly for the same observations.

The work was done quickly and accurately and is considered to have been more successful than the use of men on ropes would have been. This method could be readily adapted to the survey of any steep slope and should be particularly suited to survey operations on dam sites.

Load Tests on Concrete Piles for Bonnet Carré Trestle

WHEN a 6,000-ft. concrete pile trestle had been decided upon by the Louisiana highway commission for the new highway crossing of the Bonnet Carré flood spillway, about 28 miles north of New Orleans, the first step was to drive and load 50 test piles, to determine the safe working load, as the deep stratum of soft and wet alluvial soil affords practically no point support, and only the skin friction of the piles can be depended upon. These test piles were 20 in. square and 75 ft. long. Failure, due to load overcoming the friction in the soil, occurred with loads ranging from 70 to 160 tons. To load the pile, a heavy steel stirrup was hung on the head, and square 5-ton concrete blocks were stacked upon it, each block having a square hole in the center so that the lower blocks were slipped over the head of the pile.

Six alternative designs for the trestle were prepared, including bents of six and of seven piles and spans of 28, 34 and 38 ft., the assumed pile load ranging from 29 to 43 tons. After the test piles had been driven and loaded, the records were used in selecting the most economical length of pile, length of span and number of piles per bent. For the adopted design, with six-pile bents and 38¼-ft. spans c. to c., the load per pile was taken as 43 tons, including maximum live load and dead load. This compares with 12 to 30 tons used for some of the creosoted-pile trestles built to carry railways across the spillway. The contract for the highway trestle includes unit prices for piles 75 ft. long and under, and for piles from 76 to 90 ft. long. It is of interest to note that in the construction of the trestle one of the 90-ft. piles of 20-in. square section penetrated to a depth of 60 ft. under its own weight and that of the pile hammer.



STEEL STIRRUP hooked over pile head carried load of cast concrete slabs for testing concrete piles for highway trestle across Bonnet Carré spillway.

This trestle was designed under the direction of N. E. Lant, bridge engineer of the Louisiana highway commission, and the loading tests were planned by him. The contractor is the Keliher Construction Co., Dallas, Tex.

Letters to the Editor

Innocuous but Inane

Sir—The board of direction of the American Society of Civil Engineers, under date of Oct. 1, 1934, referred to its corporate membership for letter ballot a proposed addition to its code of ethics, which in essence states that: *It shall be unethical to be unfair.*

The following disposition of ballots may be assumed:

a—Immediate deposition in the wastebasket by busy members who failed to see three cents' worth of significance in the outcome.

b—Placed to one side by cautious members who wondered why a ballot was sent.

c—Voted at once and returned by efficient members who are franchise-conscious but who keep their desks clear at all costs.

Class *a* doesn't count. The writer predicts that class *c* will greatly outnumber class *b*, many of whom will eventually fail to vote. A few of the class *c* voters will detect or fancy that they detect an issue, but it is predicted that the majority will rubberstamp the action of the board of direction on the assumption that the board has considered the matter carefully, or perhaps because the paragraph *says nothing* and *can therefore harm no one.* It seems reasonable to assume, then, that after Dec. 13 the proposed paragraph No. 7 is likely to be found dangling, like a little bell, at the end of a dignified code of ethics prepared for a dignified professional group.

It requires little imagination to visualize the distractions of a vague situation which finally drove the board of direction to attempt to appease everyone by saying something that can only be construed to mean nothing. Nothing is either said or implied that is not covered fully and with dignity in the paragraphs that precede. Unfairness is not defined. The proposed clause supplies no added basis for reaching a correct decision on any case that might be presented under it.

The editor of *Engineering News-Record* has pointed out (p. 506 of the Nov. 1 issue) that the points involved concern only a fraction of the membership. The writer knows, as the board of direction evidently discovered, that the issues involved are difficult to generalize upon and that in most cases their importance has been greatly overrated by men who, in the genuineness of their economic distress, have lost perspective in attempting to discover its cause. The writer is heartily in favor of any well-considered measure that might define fairly the fields of activity open or closed to any constituent group. He questions whether any such classification is possible beyond the point of applying the golden rule after the manner outlined in paragraphs 1-6 of the present code of ethics. Surely the American Society of Civil Engineers does not wish to adopt jurisdictional policies comparable to those of a labor union.

The writer hereby places the board of direction of the American Society of Civil Engineers in nomination for a Pulitzer prize on the basis of the following outstanding compound accomplishment:

1. Extreme efficiency, as illustrated by a call for action so precipitate that even the society's own organs were closed to any discussion of it.

2. A display of subtle humor such that the society's most dignified document becomes truly funny. No one can read it and remain depressed.

3. Supplying for the use of the schools the supreme illustration of studied redundancy.

4. Supplying for the politicians of the country an improved technique in saying something without saying anything.

If the clause is voted down, a good time will have been had by all, and eventually the joke on the society may be forgotten. If the proposed paragraph is ratified by the membership, it would appear to be the next duty of the board to devise means for undoing that which was done with undue haste.

H. J. GILKEY,
Iowa State College.

Ames, Iowa.
Nov. 8, 1934.

The Engineers' Code of Ethics

Sir—I object to the addition of the proposed paragraph No. 7 to the code of ethics of the American Society of Civil Engineers, discussed in your issue of Nov. 1, p. 566, for the following reasons:

Unless a code of ethics is concise and clear in its statements it is practically useless. Obviously, any practice that is unfair is unethical. Therefore, it seems unnecessary, and hence undesirable, to add a paragraph to the code which makes only that statement.

The proposed paragraph does not attempt to define the conditions under which the acceptance of a commission by a salaried engineer would be unfair.

It will certainly be admitted that an engineer's qualifications for any given task are independent of his source of income. It is not admitted by the writer that an income from a salary gives an engineer receiving it any advantage over another engineer having an equal income from some other source.

Many of the cases that might give rise to disputes under this paragraph involve the employment of consulting engineers on public works. In all such cases the consultants' fees would be paid from tax levies. Since the possible competing salaried engineer is just as likely to be a taxpayer as the consulting engineer, it is not clear to the writer that one has any better right to the fees than the other.

If the proposed paragraph is aimed at underbidding by salaried engineers, it should be voted down, as it is certainly not clear on this point. A code of ethics is no place for ambiguities. Also, that subject is treated in paragraph No. 4 of the present code. If more is to be said on the subject, it should be inserted in that paragraph.

At the present time many engineers are finding great difficulty in supporting their families. It is quite natural for one caught in this position to feel that he is the victim of unfairness when he fails to secure a commission which he is well qualified to handle. Such a situation is, of course, to be regretted, but the writer does not believe that it would be materially improved by an additional paragraph in our code.

It will be granted that every engineer with a reasonable income has an obligation to his less fortunate, but equally worthy, brother engineer. It may be further granted that there is some relation between the magnitude of the income and the extent of the obligation. But surely there is no relation between the obligation and the source of the income. Therefore, why weaken the code of ethics by the addition of a paragraph that is so irrelevant and ambiguous?

L. E. CONRAD,
Professor of Civil Engineering,
Kansas State College.

Manhattan, Kan.,
Nov. 5, 1934.

* * *

Sir—I have just seen the editorial in your issue of Nov. 1 entitled "A Question of Fact." It seems to me that before such an editorial was written, an effort should have been made to get the facts. An editorial of this kind, which might prejudice the vote of the members of the American Society of Civil Engineers, should not be released without at the same time printing the other side of the story.

Most of your statements are erroneous. For example, you state, "We believe that the cases to which the proposed rule is meant to apply are negligibly few in number." As a matter of fact, the abuse by engineers in the employ of educational institutions and of the great public utility companies and of municipal and state governments of their salaried positions has been so severe that this proposed paragraph No. 7 of the code of ethics is practically demanded of the society by the Cleveland, Buffalo and Kansas City sections, and I believe by several others. The sections referred to had several meetings in which this very live question was discussed at length, which discussions resulted in formal resolutions being passed practically demanding of the board of direction that it take action as indicated in the proposed new rule of the code.

The proposed addition to the code of ethics was under discussion by the committee on professional conduct of the board of direction of the society for nearly two years and was the subject of many drafts and many revisions.

You state that the addition of paragraph No. 7 is unnecessary as it is now covered by the whole spirit of the existing code. Unfortunately that does not seem to be the case. We believe that the proposed rule will be effective in reaching a wilful violator and will not harass the well-meaning engineer.

It seems to me that the last sentence of your editorial places you under obligation to get the facts and present them in your columns so that those members of the society who may have been influenced by your editorial may promptly hear the other side.

J. P. H. PERRY,
Member, Professional Conduct Committee, American Society of Civil Engineers.
New York, N. Y., Nov. 8, 1934.

RESPONSIBILITY for giving members of the American Society of Civil Engineers both sides of this question rests, we believe, with the board of direction. The ballot as it stands, by innuendo, says to the member who receives it: "So large a number of the society in salaried positions are taking advantage of those positions to compete unfairly with their fellows in private practice as to require an amendment to the code of ethics." If the society has concise evidence to support this claim, it should so advise its members in sending them the ballot. As it did not, we raised the question of what facts there were to support the call for an amendment to the code of ethics. —EDITOR.

The Case of Thick and Thin Pavements

Sir—It is probably seldom that an author has any cause to correct an editorial comment upon his own article in the *Engineering News-Record*, but a disclaimer must be made immediately to the one concerning road foundation design appearing on p. 561 in the issue of Nov. 1, 1934. Your comment reads:

Opposing opinions on base construction for flexible pavements are presented in the two articles that follow. Inflexibility of base or foundation is accepted as fundamental in both arguments. In one the means presented for securing this property is stabilization of the natural soil of the roadbed; in the other, inflexibility is obtained by an artificial foundation of material that will not change form. Choice between the two is a function of relative practicability and cost. With inflexibility obtained, the question swings to the thickness of bituminous surfacing required. In the experience of Mr. Gray this need not exceed 1 in., and in the practice of Mr. Baldock it is at least 2 in. and may be as much as 5 in., etc.

A further editorial heading notes the two articles as contrasting practice in the states of West Virginia and Oregon.

The writer feels that the two articles represent a distinction without a difference, and that the editorial comment and heading are misleading. Specifically the items in question are as follows:

1. There can be no possible difference of opinion between the views of the writer and Mr. Baldock as represented by the articles, because the procedure in Oregon represents the best engineering practice in obtaining the necessary high subgrade support at minimum expenditure, and is exactly the method recommended by the writer as a means of improving subgrades having naturally low support.

2. There is no ground for contrasting the practice in West Virginia and Oregon as divergent from one another. The use of high-grade shale is possible in only the northeastern part of West Virginia where such material is abundant and low in cost, while in other parts where the natural soil is a red clay the practice is to obtain the necessary foundation support by using a substantial thickness of gravel or stone according to the needs of the situation as well as the relative costs. The reference to a single instance in West Virginia practice was made purely to serve as an introduction to the thesis of the article.

3. There is probably a typographical error in the note that the writer recommends a maximum of 1-in. thickness of bituminous surface, as it should be made clear that this is *minimum* thickness. The thickness and kind of wearing surface depend upon the loads which are to be transmitted to the subgrade and the stability against deformation which may be obtained in any given bituminous mixture. This varies with location as well as with the character of aggregates available.

The article by the writer as reported in *Engineering News-Record* is a rather brief summary of a longer paper on the subject, and the following quotation from other portions clearly indicate the design range. For example:

It is of course recognized that there are wide differences in value of various soils ———. It would seem that ——— the whole procedure in road design should be from the standpoint of making the utmost utility of *inherent* soil values; or of *raising these values* by some inexpensive means to the highest practical level, *prior* to determining the type of wearing course. ——— Where subgrade values are *high*, the bituminous pavement *may be as little as 1 in. in thickness*, and, *where they are low, by combination with now-cost bulk materials in wide variety, the bituminous mixture is never required in greater thickness than 5 in. In between these extremes* are the several standard designs such as 3-in. sheet asphalt, 2½-in. penetration macadam, 2-in. asphaltic concrete, 2-in. road-mix, etc., etc.

It would be unfortunate to have erroneous conclusions drawn from your editorial note, which would overlook the real point of the whole paper. When the summary (as printed) was approved by the writer, there was of course no knowledge on his part that it would be used in such a contrasting manner, but possibly now that this has been done, it will serve better to focus attention upon the subject and the various ways in which high subgrade support can be most economically obtained. Taking the matter of frost action as an example, it is obvious that there are places where in the winter the *natural* subgrade support is materially reduced, unless of non-capillary character. To maintain intact a relatively thin wearing course, it is therefore necessary to add a layer of non-capillary material of such thickness as will be unaffected by frost. Mr. Baldock does this in Oregon with a 9- to 20-in. layer of talus rock or gravel which costs 10 to 40c. per square yard. In New England the same result is obtained by placing 6 to 18 in. of bank-run gravel that costs from 8 to 25c. per square yard. In West Virginia, in those areas where good shale is found, it is obtained by placing a layer of 12 in. or more in depth, while in the red clay areas it is had by placing 5 to 12 in. of rock or gravel. Having thus provided the necessary support, either with the natural subgrade or with the subgrade as reinforced, the minimum thickness of bituminous wearing course is established accordingly. This thickness will be somewhere between 1 and 5 in., according to the relative costs of raising subgrade support above 25 lb. for primary roads, or above 15 to 20 lb. on secondary roads.

BERNARD E. GRAY,
Chief Highway Engineer, Asphalt Institute.
New York, N. Y., Nov. 5, 1934.

St. Louis County Bonds

Sir—In your issue of Oct. 4, two errors have been made reflecting on the excellent record the city of St. Louis has made in voting bonds and in developing public work.

On p. 19 and again on p. 440 the statement is made that "St. Louis voters reject bonds for $5,878,000 sewer project." The City of St. Louis had nothing to do with this election. It was St. Louis County that defeated the bonds. The City of St. Louis is not in St. Louis County.

Your organization had the correct information on p. 21, where there appears a statement from Clayton, Mo., to the effect that the St. Louis County Sanitary District defeated $5,878,000 bonds, etc.

I feel that a correction of the misstatement should be published, especially in view of the fact that the City of St. Louis has recently voted $16,100,000 of bonds for various items of public work.

BAXTER L. BROWN,
President, Board of Public Service.
St. Louis, Mo., Oct. 8, 1934.

Correction of Name

Sir—Referring to my letter of comment entitled "Training in Fundamentals," which you published in your issue of Oct. 11, 1934, your attention is invited to the fact that a typographical error was made and my name was given as David E. Conley instead of David E. Donley. DAVID E. DONLEY,
Associate Hydraulic Engineer, Tennessee Valley Authority.
Knoxville, Tenn., Oct. 25, 1934.

ENGINEERING NEWS RECORD

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November 15, 1934

Made Possible by Science

IN NO PART of the epochmaking Boulder Dam enterprise has the contribution of new technologic procedure based on scientific progress been so decisive as in the steel penstock construction. Barely half a dozen years ago, welded joining of the heavy plates necessitated by the dimensions and water pressures involved would have been impossible, and X-ray verification of quality even more so. But scientific workers in the laboratories were patiently seeking out new truths, and parallel to their activities the technologists of industry were venturing forward into new fields. The former found how to control chemical contamination in arc welding, and how to produce and utilize deeply penetrating radiations for study of the interior of metal; the latter overcame one by one obstacles to heavy multiple-layer welding. Through such advances the construction of the great penstocks was made possible. Other advances were necessary—improvement in steel plate production, extension of annealing to huge dimensions, perfection of large machines for handling and working the pipes, and invention of an ingenious pin system for field connections—but at bottom it is the aid given by science that makes possible the safe control of Boulder Dam's vast power of flowing water.

An Obligation of Progress

THERE IS ANOTHER SIDE to the record of progress that is found in the Boulder Dam penstocks. It stands revealed in highlight by the accident at Hawk's Nest, Va., on Nov. 1., when five men met death in the sudden bursting of a penstock manifold while under test. Though that penstock was not as large as the penstocks at Boulder Dam, it nevertheless is a comparable example of advance in the art of penstock design in that the field fabrication was by welding instead of by riveting as has been common practice in the past. When this accident is considered as the third serious penstock failure within a year—two have occurred in Europe recently—it serves to emphasize our lack of complete knowledge of the stresses set up in so complicated a structure and points to the need for intensive study, both theoretical and experimental, of the many questions that such failures raise. It calls especially for a searching study of the evidence that is found in the damaged penstock of the Hawk's Nest plant. The owners, engineers and penstock manufacturers involved have an obligation there that must be fulfilled if the art of penstock design is to be advanced rather than retarded by this accident.

Civic Mendicancy

IN OUR EFFORTS to relieve the distress of the jobless, we have been properly apprehensive of the great danger to individual morale presented by the growth of willing or unwilling parasitism. An equally disturbing condition has been manifested by whole communities during the past year or so, but it has been remarked by few. Many cities that are fully able to support their own obligations in regard to public improvements have evidenced complete unwillingness to do so, although their desires for better community facilities have been in no way impaired. Arguments of the most specious sort have been advanced to support the contention that sewage plants, water improvements and many other types of civic betterment should be constructed by relief workers rather than by normal employment, or that in other ways the cost should be met from federal funds. The behavior of the individual panhandler with his whining plea for help is in many ways less offensive than such mendicancy on the part of relatively wealthy communities. It may be that the evils of the situation are unavoidable in view of our present method of meeting the problem of unemployment. If that is so, it is more than ever essential that the American city recognize and guard against the degenerating influence of parasitism.

Look Out for Ice

ICE FILMS on hard-surfaced roads are an accident hazard that becomes more serious as the custom grows of clearing main highways of snow for winter travel. Thawing snow, sleet storms and occasional winter rains alternating with frost form a slippery coating that cannot be prevented and cannot be removed. It has to be made non-slippery, and the season is approaching when the problem of doing this will confront maintenance engineers. The point of this situation is that they are now better informed than ever before for the task. The report a year ago of the Highway Research Board's committee on treatment of icy pavements offers the means for reducing slipperiness and also the assurance that they are safe to use. Fears that the use of the deliquescent chlorides of sodium and calcium for fixing applied grit in the ice film may injure pavement surface are groundless, the report indicated. With this assurance the materials and methods of combating the hazard of ice films are simple; but they have to be employed conscientiously.

Significant Straws

SEVERAL of the local elections of last week involved power issues, and so gave a measure of public sentiment as to satisfaction or the opposite with existing utility service, and as to the risk of going into a public power enterprise. The outcome shows that a number of communities are willing to venture the business undertaking, with all its possibilities of loss and trouble, rather than continue under private utility operation. This may mean one of two things: either local dissatisfaction—the kind of thing that some current utility publicity is well adapted to intensify—or else a growing conviction that utility service is inherently a public service so intimately related to the common welfare that it must be in the public's own hands. Everyone knows that both views exist, and by no means only or even chiefly among kickers and pink-tinged groups. If, as we suspect, both views are gathering strength on the evidence of the election just held, it is a significant pointer toward coming difficulties and problems. Among the problems is formulation of sound management policies for public power, and coupled with it the desirability of early

adjustment of state and federal spheres of action. There is also the problem of providing fair and workable coordination between public and private power systems, and of maintaining such relations of private operators and the public that all mutual adjustments will be reached in harmony and good spirit. The difficulty of assuring such relations is not least of those contained in the present power picture.

Relief and Reconstruction Through Work

UNCONFIRMED REPORTS from Washington indicate a purpose on the part of the Administration to ask for a large addition to the public-works fund. The amounts named differ, but all are large. Regardless of the actual figures, the mere fact that the Administration is planning to continue public works as a recovery agency is encouraging after the swing toward the dole that followed last winter.

Relief has been in operation on a national scale now for many months. The hope was that if the government provided the idle with the means for bare subsistence there would soon be enough re-employment by private business to build up a wave of recovery and allow relief to be ended. Business records reveal how bitterly that hope was disappointed. The indexes of business activity have declined to the level at which they stood eighteen months ago. And in addition the man in the street realizes, though Fifth Avenue and Beacon Hill may not, that irreparable damage has been done to human values by substituting public charity for the independence of productive wage-earning.

THERE is a financial side to the question, too. A year ago the cities were at the end of their resources because of relief. State governments soon reached the same point. And now it is evident that even the nation can bankrupt itself by endless relief expenditure and loss of production. That is the real fact back of the recent statement of Relief Administrator Hopkins to the effect that direct relief is to be reduced to a minimum and that in so far as possible aid to the unemployed is to be extended through useful work. That also is the telling argument in favor of productive work for re-employment; if those now idle are caused to produce, there can be no chance of bankruptcy.

WITH nearly twenty millions on the relief roll, a number greater than ever before, it is most timely to recall certain fundamentals. One of them is that those who by ill fortune are condemned to temporary idleness shall not be allowed to perish for want of assistance by the community. The next, no less imperative, is that public aid can only be a temporary stopgap until the industrial machine again functions, and that every detail of the mechanism of public aid must therefore be so directed as to restore the flow of business life in the normal industrial channels.

THE new works program that may start in motion in July, when the new fiscal year begins, has to be shaped to these fundamentals. The winter work program to serve until then, whatever it is to be, must equally observe them. In both programs it is essential that the work be of large volume and widely distributed; that it be productive, and responsive to recognized, real needs; that it proceed in every possible way through established industrial agencies; and that it include a maximum of encouragement to resumption of private initiative.

In so far as stimulative loans or grants to private industry can provide some of the employment required in the situation, they are entitled to utmost consideration. But at best these can accomplish only a small part of what is necessary; the major reliance is on the construction of works of general welfare. Public-interest works alone in the whole range of possible employment activities have the volume, the wide distribution and the responsiveness to recognized needs that are essential. But they also will fail of their recovery purpose unless they are utilized in conformity with the other controlling dictates: namely *first*, that they be made to function through established industrial channels, and *second*, that no discouragement be offered to private initiative, but on the contrary every possible encouragement. It was disregard of these conditions that made much of last winter's CWA work useless for recovery.

THERE is no doubt that much useful work is available for the proposed program, and much of it can be put under way quickly if unnecessary restrictions are swept away. Last winter, because of these restrictions, we had the absurd situation of the PWA on the one hand holding up the granting of money while its engineers checked the drawings of a bridge designed by Ralph Modjeski or until its sleuths checked up on the responsibility of a contractor of long standing, while on the other hand the CWA handed out money from the same source with almost uncontrolled liberality. Neither of these extreme conditions is constructive.

It is quite possible to develop a system whereby an initial allotment of money can be made available quickly for any project that passes a few broad general requirements, with subsequent allotments made contingent on evidence that the money is being spent properly. Such a system should by all means be devised. A works program carried out under it will have the great opportunity of not only relieving the helpless unemployed but also giving the big initial push toward industrial resumption, that has been awaited with hope for three years.

SO MUCH for the situation and its possibilities of success. What of the preparatory work that must be done? The work must be planned, or it will fail of the objective; there must be investigation, design, and preparation for execution. Fortunately the means for these are at hand. Engineers, architects, construction men and producers of materials are ready for every purpose of the largest and most rapid emergency program. They know the field of activity concerned, they know the planning and construction as well as the management problems involved, and they are competent also to advise safely on how it is possible and necessary to avoid interference with private initiative.

By turning the greatest possible amount of the government's emergency money into normal construction channels, through which it can reach the heavy industries whose lack of work is the chief source of present unemployment, a program of this kind would become the decisive stroke for economic revitalization.

CURRENT NEWS

Adjustment Board States New Policy On 48-Hr. Work Week

AT the annual meeting of the National Construction Planning and Adjustment Board held in Washington Nov. 8 and 9, an important decision was reached affecting approval of applications for a 48-hr. work week on construction projects. Reviewing the experience in handling requests for relaxation of the 40-hr. maximum provisions of the construction code and granting 48 hr. under specific conditions, the board adopted a definite policy to insure fair competitive conditions in bidding, which provides that on approval by the board, employees may be permitted to work 48 hr. a week instead of 40 on remote and isolated projects where camps are necessary for housing or boarding of the majority of the labor employed. In the past, each case has been a matter of individual review.

The board has ruled that ordinarily it will not grant such permission after the contract is awarded unless conditions, unforeseen at the time the project was developed, clearly support the case. The intention is that requests for a 48-hr. week should be made before the project is undertaken or bids requested; otherwise unfair competition might exist in the bidding if all bidders did not figure uniformly on either a 40- or 48-hr. week. The decision is important to contractors bidding on isolated projects. It suggests that where the proposal does not indicate whether the Construction Planning and Adjustment Board has passed upon the possibilities of a 48-hr. work week, this decision should be requested by the owner before bids are received.

Other actions

In addition, various actions were taken to promote compliance with the construction code, particularly the labor provisions. The board considered several matters involving mutual interests of employers and employees in the construction industry. It passed a resolution to be sent to all governmental agencies engaged in work relief urging that such projects be handled through normal agencies in the construction industry. It entered a protest against governmental jurisdictions constituting preferred buyers under various codes of fair competition, creating the incentive for day-labor construction and further restriction of normal construction processes through the contract system.

The board discussed the establishment of regional planning and adjustment boards which would handle labor compliance cases and assistance in establishing area agreements for the stabilization of wage rates in addition to the settlement of labor disputes. This program was not adopted, but will be considered after further analysis at the next meeting of the board, which will probably be held in Knoxville, Tenn., in conjunction with the Construction Code Authority sessions, Dec. 6-8.

Low Bid of $7,133,005 for Spillway at Fort Peck Dam

A low bid of $7,133,005 was submitted by the Massman Construction Co., Kansas City, Mo., to the Corps of Engineers for building the spillway at Fort Peck dam. Bids were opened Nov. 12, following readvertisement after the original bids had been rejected several weeks ago. Principal items of the work include 5,300,000 cu.yd. of earth excavation, 5,250,000 cu.yd. of rock (shale) excavation, 242,000 cu.yd. of reinforced concrete and 18,720 tons of steel.

North Carolina Route Selected For National Park Highway Link

The route through North Carolina has been selected for the connecting highway link between the Shenandoah and Great Smoky Mountain National Parks, according to a release from the office of Secretary Ickes. One of the factors in the selection of the North Carolina entrance route, rather than the alternate location through Tennessee, was the existing entrance to the Great Smoky Mountain National Park through Gatlinburg, Tenn.

This decision locates the first 150 miles of this important 400 mile scenic parkway and highway to be built by the Bureau of Public Roads and operated by the National Park Service. The PWA has allotted $16,000,000 for the project. A 250-ft. right of way is to be provided in fee by the states with easement for a total width of 1,000 ft. to be available for developing of parking areas.

Illinois Court Rulings Conflict on Sales Tax for Water Revenues

Two contradictory court opinions were handed down Nov. 9 on the legality of the Illinois retail occupational tax (sales tax) as it applies to the utility services of municipalities. In Springfield, three circuit judges, sitting en banc, held the tax to be legal and almost simultaneously a judge in Chicago ruled the tax illegal and issued a permanent injunction restraining the state director of finance from collecting the tax from sixteen Cook County cities and villages.

The imposing of the state sales tax on water services in the city of Chicago would add about $250,000 to the annual bills, according to estimates. The municipalities base their case on the sales tax being illegal for municipal utilities principally on the grounds these utilities do not deal in tangible property, municipalities should not be taxed because they supply a public service.

Bids for 5,000,000 Bbl. Cement Called for Colorado Aqueduct

The Metropolitan District of Southern California is calling bids for 5,000,000 barrels of cement. It is believed that this order is the largest order for cement ever called at any one time for a particular project. Bids will be received Nov. 27. The cement is to be delivered over a period from July, 1935, to June, 1940, and the district reserves a right to modify the order by 20 per cent either way.

New York Contractors Act to Forestall Wage Increase or Reduced Working Hours

THREE GROUPS of New York City contractors, sitting in a combined session Nov. 8, passed resolutions which will prevent any employer group signing new agreements with trade unions calling for a reduction in working hours or increase in wage scales from those now prevailing. The action was taken following consummation of an agreement between the electrical contractors and electricians calling for reduction of working hours from eight to seven per day without any reduction in daily wages, virtually a pay increase of 14 per cent. This brings the electrician's scale to $1.60 per hour. The contracting groups concurring in the resolutions are the Building Trades Employers Association, the Metropolitan Builders Association and the Building Contractors Employers Association.

A committee of these three groups of contractors made a concerted effort to prevent the signing of the electrical trades agreement, even going to Washington to present the case to President Roosevelt, who referred them to the Department of Labor. Fears of direct and indirect sabotage and a desire for peace on their jobs outside the city are the reported reasons for the electrical contractors meeting the demands of the electricians. The new scale does not affect existing contracts, as far as contractor members of the electrical contractors association are concerned. However, demands for immediate observance of the new scale on two outside contractors working in New York have met with refusal, with resulting tie-up of work. Installation of elevators on the new Italian building at Rockefeller Center and the installation of conveyors at the postoffice annex have been affected.

Following the meeting of the employers, spokesmen for trade unions declare there is no general effort under way on the part of union labor to demand higher wages or shorter hours. Brick masons have the only area agreement in the vicinity, running for two years. Stone setters, marble trades, elevator erectors and painters have local agreements, some of which expire soon. All other trades in New York City are without agreements at the present time.

Additional Contracts Awarded for Colorado River Aqueduct

Following the opening of bids on Oct. 31 for the last 30 miles of the Colorado River aqueduct, the Metropolitan Water District awarded contracts totaling $2,611,204 to J. F. Shea, Inc., on five schedules. On five other schedules, all bids were rejected and these will be re-advertised. No action was taken by the board of directors of the district on a recommendation for award of contract on the one remaining schedule. The low bidder for this schedule was the Western Pipe & Steel Co.; the bid was $595,812.

TVA Prepared to Absorb Cost of Muscle Shoals in Power Setup

The Tennessee Valley Authority is prepared to absorb the entire cost of the Muscle Shoals Dam, navigation locks and power plant, estimated at $60,000,000, as part of the cost of its power system, if that appears necessary to Congress, according to a statement made by David E. Lilienthal, a director of the TVA, before the joint meeting of the Mid-South and Tennessee Valley sections of the American Society of Civil Engineers held in Knoxville, Tenn., last week. Mr. Lilienthal's statement, apparently, was made in answer to a recent statement of W. L. Wilkie, president of the Commonwealth & Southern Corp., in which he charged that unless the total cost of the war-time built Muscle Shoals plant was figured in the rate base of TVA power the purchasers of that power would be subsidized to the extent that full costs were not included. The $60,000,000 includes $4,250,000 for the navigation locks and that portion of the cost of the dam that is chargeable to navigation.

Mr. Lilienthal said, in part: "In order that all argument may be avoided the authority is in a position, on the basis of present rates, to repay not only the actual investment for power purposes, but to pay back every penny that was invested in Wilson Dam for any and all purposes. Congress may decide that in order to remove the red herring of the value of Muscle Shoals from the trail once and for all such a disposition should be made."

France Starts Public Works Plan as Unemployment Relief Program

An extensive program of public works has been inaugurated by the French government to relieve unemployment. This plan is estimated to cost 10 billion francs and is to be financed by allotments from the Social Insurance Funds of the country. About 1.5 billion francs are expected to be made available annually from this source of revenue. Under the program it is hoped that the work will provide jobs for about 100,000 in the fields of building construction, metallurgy and common labor where the unemployment situation is the more acute.

The program, as outlined, provides for a variety of projects. The large appropriations to be designated include: electrification of railroad lines, 1.3 billion francs; hydro-electric development in rural regions, 1.16 billion francs; improvements to the Paris subway system, 1.1 billion francs; highway development, 1 billion francs.

Arizona Declares Truce in Parker Dam "War"; Sec. Ickes Confident of Amicable Solution

A CESSATION of preliminary construction operations at the Arizona side of the Parker Dam site on the Colorado River resulted in halting the advance of the Arizona militiamen who had been dispatched by Governor B. B. Moeur, following his declaration of martial law at the eastern side of the site. Present construction work on the east bank of the river consists of driving piles for a construction bridge. The main operations of the contractor, Six Companies Inc., are on the California side of the river (illustrated on this page) and will be continued. The Governor announced, according to reports as this issue goes to press, that he would withdraw his martial-law proclamation when he received official word that work had been stopped. Construction of Parker Dam is under the direction of the Bureau of Reclamation.

Secretary Ickes expressed confidence that the entire controversy will be settled amicably as soon as the present excitement has subsided. The Secretary left Washington Nov. 12 for a speaking engagement in Texas without taking any action on the Arizona situation. He stated that the state of Arizona has no reason to fear the loss of any rights as the controversy is primarily a subject for court decision.

The governor of Arizona dispatched national guardsmen to the dam site Nov. 12 under instructions "to do any and all things necessary to see that the sovereignty and territory of the state are not trespassed upon." The most immediate possible effect on construction operations resulting from this move was the stoppage of work on the construction trestle, as noted above, by the contractors, Six Companies Inc., from their main headquarters on the California side of the river.

The immediate controversy involves the possible disposition of one-half of the power to be developed at Parker Dam. There is the further question of storage rights for Arizona in the Boulder Dam reservoir and the contract which is being negotiated between the state and the federal government is being opposed by the other six states of the Colorado River basin.

Relative to the legal problems involved, Secretary Ickes stated, "We have a fairly respectable legal opinion that the federal government has jurisdiction over navigable streams."

New Tunneling Record Set for Colorado River Aqueduct

The crews of the J. F. Shea Co., working in the east and west headings of the Cottonwood tunnel of the Colorado River aqueduct project, drove 1,875 ft. of bore during the month of October. This work sets a record for two-heading tunneling operations on the aqueduct on a 6-day week basis. Average footage per shift was 10.7 in the east heading and 11.5 in the west. Both headings have been fully supported since they were started. In the east, timber has been used exclusively and in the west the first 7,200 ft. was timbered and the rest has been supported with a combination of steel ribs and timber lagging. Gilbert Shea is general manager of the work for the J. F. Shea Co.

CONTRACTOR'S CAMP AREA AT PARKER DAM SITE

Buildings for the permanent camp of Six Companies Inc., contractor for building the Parker Dam, are under construction at the construction townsite on the California side of the Colorado River. A subcontract provides for the building of 20 two-room cottages, one combined dining hall, store and commissary, one office building, dormitories for 225 men, and a four-room school. The site for this building activity is shown in this view of the camp site.

The access road from the existing highway to the construction trestle which will be built across the river has been completed. Electric power is available at the site from the lines of the Metropolitan Water District. The water supply will be developed through wells.

The dam is being built under the direction of the Bureau of Reclamation to provide the diversion structure for the Colorado River aqueduct.

Land Expropriation Being Studied for PWA Housing

THE PWA Housing Division is seeking to determine whether there is a basis for legislation which would empower the federal government to seize land in slum areas and pay the owner a price consistent with its intended use. Land prices in excess of what new housing can bear and the time and expense of present condemnation procedure have combined to hobble PWA's housing program to date. The principle to which PWA is now turning in an effort to bring down costs and speed up its operations has been adopted in England where nothing is paid for old buildings in slum areas and the price paid for land is limited on the theory that the owner of the property is responsible for present conditions and should bear the loss which cannot be charged to new buildings designed to provide really low-cost housing.

Col. Horatio B. Hackett, chief of the housing division, said his investigation may reveal controlling reasons why expropriation of land cannot be resorted to in this country but that PWA is weighing every means that seems to offer any hope of solving the problems involved in acquisition of sites.

New projects

Low-cost housing projects in Louisville, Ky., and Brooklyn, N. Y., were announced by PWA this week. The size of the New York project also was increased. In Louisville condemnation proceedings were filed against three square blocks, to complete assembly of an 11-acre site for a $1,500,000 development. This is the eleventh federal project, others being in New York, Chicago, Cleveland, Atlanta, Indianapolis, Montgomery, Detroit and Cincinnati. One-third of the new development will be two-story row houses, with front and rear yards and space for gardens. The remaining two-thirds will be devoted to three-story apartment buildings. There will be a total of 1,500 rooms provided. Buildings will cover not more than 30 per cent of the site and will be of fireproof construction with full basements.

Plans for the project contemplate closing streets now transversing the site through cooperation of the city of Louisville, and the rearrangement of the site in accordance with the needs of the buildings. The site is being laid out to fit a program of street widening authorized by the city in the district, and with a view to the future orderly development of that part of Louisville.

The project in Brooklyn is of limited-dividend type, represented by an allotment of $1,670,000 to the Brooklyn Polytechnic Institute. The application of the Institute for a housing project was received at a time when limited dividend corporations were still being considered for PWA aid. The project will be constructed and operated under supervision of the housing division of PWA. It will provide upwards of 400 apartments and it will be located on the block bounded by Fourth and Fifth Sts., Fourth and Fifth Aves., adjacent to a city park area.

Upon completion of the amortization of the government loan and continued payment of taxes and charges, the project will revert to the Institute, subject to requirements of the New York state housing laws. The equity of the Brooklyn Polytechnic Institute in land and in cash in the project amounts to 21 per cent.

New York Housing Authority project

The site of the project sponsored by the New York Municipal Housing Authority in the Williamsburg section of Brooklyn was increased from 8 blocks to 12 blocks or some 20 acres, with the approval of PWA, provided the city installs adequate school facilities. The cost of this project will be about $12,000,000, and it will house 2,500 families in an area bounded by Bushwick Ave., Leonard St., Maujer St., and Scholes St. Mayor LaGuardia has assured the PWA that the city will provide schools, streets, etc., and on this assurance PWA has given its authorization for the increased size of the project.

Bond Elections in Oklahoma Add to Construction Work

Several bond issues voted by municipalities in Oklahoma at the recent election insure construction projects in several localities. Citizens of Tulsa approved bond issues totalling $100,000 for waterworks and sewer improvements, as part of a winter construction unemployment relief program to be aided by the FERA.

Voters of Ardmore approved the $34,000 bond issue for a city sewage plant, but voted down a proposed $27,000 issue for a filtration plant. Duncan voted $25,000 in bonds for purchase of a site for a 500-acre reservoir, which is the city's part of a $220,000 project. The state attorney-general has approved a $28,000 bond issue for waterworks improvements at Alva.

Another Conservancy District Is Planned in Ohio

Definit steps to form the Scioto-Sandusky Water Conservancy District in Ohio were taken when representatives of fifteen of the seventeen counties in the proposed area met and presented petitions from groups of property owners. The petitions for setting up the district were presented to the local judge, in accordance with the proceedings required by the Ohio conservancy law. The formation of the district was considered preliminarly to making a request for federal assistance in the water conservation program. The estimated cost of the project as proposed is $40,000,000.

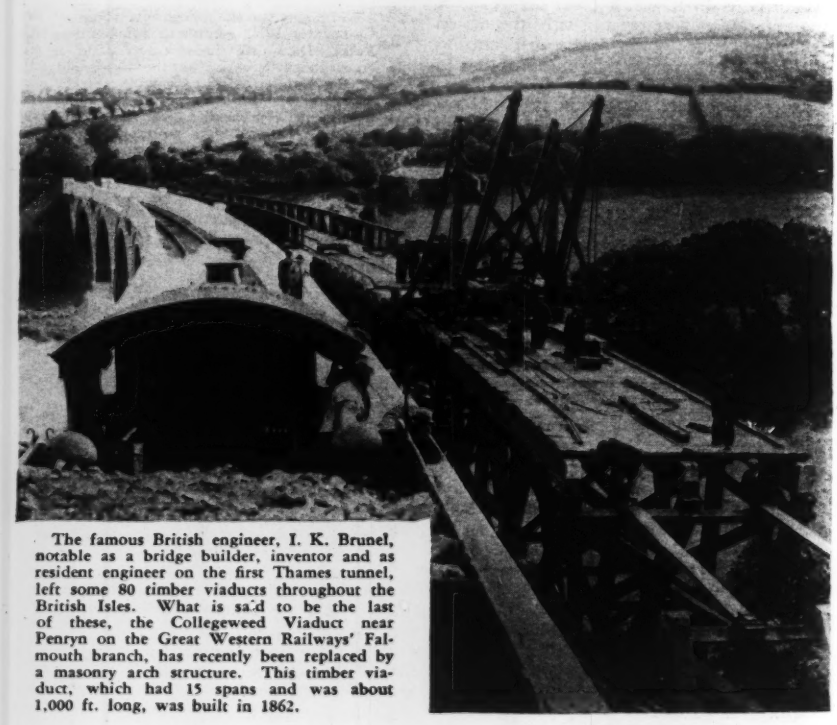
Power Commission Grants License for Municipal Power Project

The application of Greenwood county, South Carolina for license to build a municipal power project at the Buzzard's Roost site on the Saluda River has been approved by the Federal Power Commission. The Commission found that the project "will be best adapted to a comprehensive scheme of improvement and utilization, for the purposes of navigation, of water power development, and of other beneficial public uses."

The project provides for construction of an earth dam creating a head of 60 ft. and a reservoir capacity of 272,000 acre-ft. The power installation will consist of three 5,000 kw. units. The main transmission line, 84 miles long, will be built to the three principal towns in the county, and an additional 100 miles of secondary and distribution line are planned for rural electrification.

The PWA allotted $2,767,000 as a loan and grant for this project.

LAST OF BRUNEL'S TIMBER VIADUCTS BEING DEMOLISHED



The famous British engineer, I. K. Brunel, notable as a bridge builder, inventor and as resident engineer on the first Thames tunnel, left some 80 timber viaducts throughout the British Isles. What is said to be the last of these, the Collegeweed Viaduct near Penryn on the Great Western Railways' Falmouth branch, has recently been replaced by a masonry arch structure. This timber viaduct, which had 15 spans and was about 1,000 ft. long, was built in 1862.

PWA Completes Negotiations for First Lease-Financed Project

(Washington Correspondence)

Bids have been called for Nov. 20 on construction of a state prison in Tatnall County, Ga., the only project which PWA has undertaken to build under lease that eventually will defray its reimbursable cost to the government. It was anticipated when this provision was written into the law (Title II of NIRA) that it would be extensively used in cases where limitations on the borrowing power of state and local governments prevent them from applying for PWA loans. The lease provision has not been effective, however, in avoiding such limitations. A few other leasing proposals are on the PWA docket but the lease contract with the state of Georgia is the only one that has been negotiated to date.

The rental to be paid by the state will be an amount equal to 5.783 per cent of the reimbursable cost of the project, which is the final cost of construction plus interest at 4 per cent less the customary grant of 30 per cent of the cost of labor and materials. The period of amortization on this basis is 30 years and upon payment of the total amount in that period, or sooner as is said now to be proposed by the state, the government will execute a quit claim deed to the property. If the state fails to fulfill its obligation, title to the property will remain in the federal government. In that event it would be utilized as a federal prison.

This was an important factor in the adoption of the leasing method in this instance. Apart from other considerations, PWA has not favored the building of waterworks, sewage disposal plants and other public improvements on a lease basis because it does not like the prospect of having such property revert to it with resulting problems of management, maintenance and operation.

Reports current prior to advertisement of bids that PWA had contemplated construction of the Georgia prison on force account were refuted by officials, who stated that not since the state had applied to PWA for the $1,500,000 allotment has the use of day labor been considered. On the attitude of the state, prior to that time, PWA officials were not informed, but it was their belief that construction by day labor rather than by contract had never been contemplated as the state had not acquired the site or taken any steps toward execution of the project prior to applying to PWA.

Hand Labor to Be Required for Building Excavation in Canada

After a protracted period of consideration, the Canadian government has decided that the general contractor for the new Montreal Postal Terminal building must carry out the excavation of the 36,000 cu.yd. for the foundation by hand labor. The extra cost of this work was not estimated. The 100 men employed at present on the work will be increased by about 200 more during this hand labor work and the required picks and shovels necessary for the work were delivered to the job with appropriate publicity. Excavation is to be carried down almost to rock through water-bearing gravel.

European Housing Experts Suggest Formula for Low-Cost Housing in America

HOUSING of families whose income does not permit accommodations for decent living is declared to be the government's responsibility by the European housing experts who have just completed a report applying their views to conditions revealed on a tour of 14 American cities (*ENR*, Oct. 18, 1930, p. 505). The policy suggested for a long-term housing program in this country will be an influential factor in the present development of the administration's plans, it is believed. The findings of the European visitors were endorsed this week by a majority of the membership of the National Association of Housing Officials.

Subsidy necessary

Subsidy is shown to be necessary if a minimum standard of housing is recognized as a part of subsistence but Sir Raymond Unwin, the British authority, and his colleagues from abroad represent that public agencies can provide housing at a self-liquidating cost that will increase the number of families which can afford to pay the rent without subsidy. Rent rather than ownership is regarded as the only practicable basis of financing housing for low-income groups.

The prejudice against subsidized housing in this country still persists, although FERA funds now are paying the rent bills of unemployed families throughout the country. The argument that better housing at lower rents is actually a subsidy to low wages is dismissed by the European experts as overlooking many more important influences that regulate wages.

Decentralization of authority

Establishment of a permanent and non-political federal housing agency is recommended, to assure continuity of policy and to supervise activities in local communities where government credit is given. Beyond that, however, the experts advocate decentralization because housing is essentially a local matter depending on widely varying conditions. That the proposals for organizing a long-term program differ from the administration's emergency measures which centralize initiative and control in Washington is not intended to imply criticism of present activities but Sir Raymond comments pointedly that calling upon local interests to assume responsibility is an effective means of arousing a sense of it.

Out of their experience in England and Germany, the European experts advised that the greatest opportunity in lowering rents further than private enterprise can go is not in the reductions made possible by large scale, continuous construction but from the use of public credit to obtain lower interest rates on long-term amortization combined with elimination of many risks inseparable from ordinary unregulated building.

In considering economies in construction the European consultants cautioned American officials not to cut the standard of accommodation too drastically as the probability is that the generally acceptable level will rise rather than fall during the life of the building, thus hastening its depreciation. Also, if floor space is reduced too much, the rent will be increased by the abnormally large proportion required to pay for investment in site, utilities, equipment and other constants.

Failure of the limited dividend corporation as an effective means of providing low-cost housing in this country is attributed to the present method of lending it 80 per cent or more of the capital as a first charge and requiring it to raise the 20 per cent equity which takes practically the whole of the risk without any prospect of more than a low rate of return. The European experts suggested wider distribution of the risk by guaranteeing a low rate of return, perhaps 3 per cent, on all capital invested, and allowing the corporation to pay up to a prescribed maximum if successful.

Housing in slum areas

Another factor which, in the opinion of the European experts, is standing in the way of low-cost housing development in this country is PWA's policy of combining such projects with slum clearance in almost every case. Both are recognized as parts of any complete program but only within special conditions do areas cleared of slums offer the best opportunity of doing low-cost housing. Slum clearance involves expenses and losses which seldom can be recouped directly from new residential buildings erected on the site to conform with acceptable standards and hardly ever when the buildings are to house lower income groups. The European experts suggest that the loss must be borne by the owner of the slum dwellings or be met by subsidy.

Limiting land prices

Sir Raymond expressed the opinion that legislation might well take the same course as in England where responsibility for slum conditions is placed upon the owner by limiting the land prices and allowing nothing whatever for the old buildings to be replaced by new housing. As an alternative or pending such legislation, some form of subsidizing the new housing can be justified by the heavy expenses which slum areas thrust on public health, welfare, fire prevention and other services.

Pertinent, as relating to the plans which the administration now is developing, is the European delegation's statement that low-cost housing constitutes one of the most effective and least costly types of relief work because it does not displace work otherwise undertaken by private enterprise, expends the capital cost mainly in labor widely distributed among the building trades and manufacture of materials, ploughs idle credit into revenue-earning and self-liquidating assets that also yield large returns in social amelioration.

Tacoma Bridge Project Will Not Be Financed by PWA

City officials of Tacoma, Wash., have been notified by Administrator Ickes that the PWA will not be able to match the state funds which have been allotted to aid in the building of the bridge across the Narrows at that city. The state had set aside $350,000 from the $10,000,000 state public works bond issue to be used for this bridge project. This money will now be returned to the state funds and is available for other use.

Denver Secures $3,500,000 PWA Loan to Build Water Supply Project

THE DENVER municipal water board has signed the contract for a loan and grant of $3,500,000 from the PWA for the construction of the Moffat tunnel water diversion project. Allotment of the money has been announced by the PWA. This project will bring water from the western slope of the continental divide through the pioneer bore of the Moffat tunnel to augment Denver's water supply by 54,600 acre-ft. annually. The contract is subject to approval of Administrator Ickes and is also contingent upon the signing of supplementary agreements to be adopted by the board and the Administrator. No serious difficulty is expected, however, in these negotiations, and the long planning looking to the construction of the project is now definitely nearing an end.

Present plans provide for starting work on the project by January and completion by July, 1936. Herbert S. Crocker, consulting engineer for the water board, was expected to release detail plans for the work on his return to Denver from Washington. Briefly, the city owns water rights on the Fraser River on the western slope of the divide, and a gathering system will be constructed to deliver the water to the west portal of the pioneer bore of the Moffat tunnel. It will be diverted to the eastern slope through the tunnel and ultimately reach the South Platte River below Denver. The city will exchange this water with owners of prior rights above Denver so that an equal supply will become available for the municipality.

Work involved

The work will include construction of a tunnel on the western side 2,200 ft. long, concrete lining of the Moffat pioneer bore (6.2 miles long) and the construction of five short tunnels aggregating 7,600 ft. on South Boulder Creek on the eastern slope. There will be a diversion dam and five siphons of a total length of 6,500 ft. Other work will include 1,300 ft. of flumes and 15,000 ft. of canal. No definite statement has as yet been released, but it is expected that the work will be done by contract and that call for bids will be ready in about a month. Employment will be furnished for about 1,000 men during the construction period.

Thirty per cent of the $3,500,000 PWA financing will be the usual grant by the government for labor and materials. Title will be conveyed to the government until the loan is repaid. The municipality will issue rent certificates in payment for the utilization of the project and amortization of the loan, these certificates to be in denominations of $1,000 each and payments will run from 1937 to 1969. The International Trust Co. will be trustee and the board will advance $175,000 annually toward the amortization of the loan. The funds for payments will come out of water revenues.

Oklahoma Highway Fund Has Deficit of $1,000,000

A $1,000,000 deficit in the state highway fund of Oklahoma is the direct result of diversion of gas tax revenues. As a consequence there is possibility of the state losing its regular allotment of federal aid funds unless the next legislature takes action to increase the revenues of the department. The last legislature diverted 40 per cent of the state's share of the gas tax to a special fund to pay treasury notes issued to fund a deficit of several years' standing, leaving the highway department only sufficient funds for maintenance operations from this source of revenue.

Highway Contractors Exempted From Stone and Gravel Code

Contractor-producers who obtain sand, gravel or stone for public highways from publicly-owned or controlled lands have been granted a 90-day exemption from the code for the crushed stone, sand and gravel, and slag industries. "Contractor-producers" are contractors who both produce and apply highway materials. The exemption was requested by the Bureau of Public Roads to eliminate misunderstandings and difficulties which had arisen in determining whether these contractors are under the code for the crushed stone, sand and gravel, and slag industries. Most of them operate under the construction code.

The exemption, the Bureau of Public Roads informed NRA, "will greatly facilitate advertisement and award of road projects throughout the whole country." A public hearing will be held within the 90-day period to discuss the question and to reach a final settlement of this involved problem.

Contractor-producers under the exemption must observe the hour and wage provisions of the code for the crushed stone, sand and gravel, and slag industries if they are superior in particular cases to those of the construction industry's code. Other code provisions had brought about the misunderstandings responsible for the exemption order.

Washington Makes Plans for State Flood Control Program

To study possible methods for obtaining a fund of $500,000, to finance flood control projects in the state of Washington, a committee has been appointed by the governor consisting of E. F. Banker, director of conservation and development, and Lacey Murrow, director of highways. It is the plan of Mr. Banker, according to reports, to recommend a permanent state flood control fund with the idea of cooperating with the federal government in a state-wide program.

At the present time surveys are under way to determine the amount of annual flood damage incurred in the nine counties in the western part of the state. The surveys include determination of damage to both rural and urban property, and this information is considered necessary before approaching the federal government for aid in an extensive program.

Engineers on Colorado Aqueduct Reassigned as Work Expands

In preparation for the beginning [illegible] additional 110 miles of construction [illegible] tions on the Colorado River aqueduct, supplementing the 91 miles of tunnel driving already under way, there has been a major reassignment of engineering personnel by F. E. Weymouth, chief engineer and general manager of the Metropolitan Water District. According to an announcement issued Oct. 16, J. L. Burkholder, assistant general manager, has moved his office from the Los Angeles headquarters to the field headquarters of the district at Banning. J. B. Bond, construction engineer, has been placed in direct charge of Divisions 5 and 6 on the western end of the aqueduct, succeeding B. C. Leadbetter, division engineer, who has been transferred to Division 4, north of Indio. R. B. Diemer, formerly division engineer of Division 4, has been moved to Los Angeles to take charge of the work on the distribution system, succeeding W. E. Whittier, who has been transferred to become engineer of Division 2.

Personals

JAMES A. WETMORE, the lawyer who twice refused appointment as supervising architect of the Treasury Department, but acted in that capacity for eighteen years, will retire from government service Nov. 30.

ALFRED MULLIKIN, whose six months appointment as associate consultant to the Maine state planning board recently expired, has been reappointed to that position by the National Resources Board until March 15, 1935.

RALPH L. BLOOR, associate engineer in the U. S. Engineer's Office at Louisville, Ky., has been promoted to the rank of engineer and transferred to the division headquarters of the Corps of Engineers at Cincinnati, Ohio.

FREDERICK A. GABY, former chief engineer of the Hydro-Electric Power Commission of Ontario, has been appointed assistant to the president of the Canadian Pacific Railway with headquarters in Montreal. Mr. Gaby will be in direct charge of the investigation of competing forms of transportation.

FRANCISCO GOMEZ-PEREZ has left the designing department of the Mexican Commission on Irrigation, and is professor of structural design in the Higher School of Building Construction, Federal Department of Education of Mexico.

Obituary

HARRY KORNFELD, engineer of building design for the General Electric Co. at the Pittsfield branch of that company, died suddenly at his home in Pittsfield, November 8, at the age of 47. He was born in New York in 1887, graduated from Cornell University in 1911, and after extensive general engineering work, entered the employ of the General Electric Co. in 1919.

ALFRED FYEN, civil engineer and former Director of l'Ecole Polytechnique de Montreal, died in Montreal Nov. 2 at the age of 69. Mr. Fyen was born and educated in Belgium, coming to Canada in 1903, when he founded the School of Surveying

of Laval University, Quebec City. Five years later, in 1908, he was appointed director of l'Ecole Polytechnique, a position which he held until his retirement in 1924, when he was appointed honorary director.

JOHN ATWELL, paving contractor of Syracuse, N. Y., for many years, died at his home in that city Nov. 6 at the age of 77. He was a graduate of Syracuse University in 1884.

ALEXANDER C. HOOPER, age 33, a member of the engineering organization of the Metropolitan Water District of Southern California, was killed in an automobile accident near Glendora, Calif., Nov. 6. Previously he had served on the city engineer's staff of Pasadena, Calif., and the construction operations at Morris Dam.

SIR DONALD MANN, well known Canadian railroad builder and financier, died at Toronto Nov. 11. He was 81 years old. He was particularly widely known as one of the firm of Mackenzie & Mann, formed in 1886, which developed and purchased increments of railroad which subsequently formed the nucleus of the Canadian National Railway. Sir Donald was one of the outstanding figures of the era of extensive railroad building in Canada.

EDWARD M. BURD, for many years civil and hydraulic engineer of the Consumers Power Co., Jackson, Mich., was killed in an airplane accident Nov. 5. He served for several years on the hydraulic power committee of the Edison Electric Institute (formerly N.E.L.A.). Mr. Burd was born at Grand Rapids, Mich., in 1886 and graduated from the University of Michigan in 1911. His professional career was almost all spent in that state and included work in various municipal and construction fields. He was with the Fargo Engineering Co. for several years. In 1909 Mr. Burd joined the staff of the Consumers Power Co. and had been with that organization in the capacity of hydraulic and civil engineer since that time.

WYNKOOP KIERSTED, widely known consulting sanitary and hydraulic engineer, died at his home in Liberty, Mo., Nov. 7 at the age of 77. He was particularly well known in the Mid-West section of the country and designed waterworks and sewage systems for several important cities. Born in 1857 in New York, Mr. Kiersted graduated from the Rensselaer Polytechnic Institute in 1880. After spending several years in Omaha and Kansas City he became chief engineer for the new waterworks then under way for Galveston, Texas, returning to Kansas City two years later. For the next few years he was active in the design and operation of the waterworks department of the two Kansas Citys and designed the sewage system of Kansas City, Kansas. During the war he acted as supervising engineer at Camp Funston. He subsequently served as a member of the board of review on the sanitary problems of Chicago and Kansas City and recently was chief engineer of the new water supply system built for Amarillo, Texas. Mr. Kiersted was a member of the American Society of Civil Engineers and served as director in 1906-08.

CONSTRUCTION STATISTICS OF THE WEEK

HEAVY ENGINEERING construction contract awards for the week total $21,343,000, a slight gain over the total reported last week, but nearly four million dollars under the average weekly awards for the year to date. The week's totals include $16,257,000 in state and municipal contracts, $1,340,000 in federal government awards and $3,746,000 in private contracts. Total contracts to date this year amount to $1,123,813,000 as compared with $904,698,000 for the same period of 1933.

Large contracts reported for the week include canals and siphons for the Colorado River aqueduct, $2,611,000; highways in New York, $520,000, Connecticut, $719,000 and Illinois, $650,000; diversion channel for Cahokia Creek, St. Louis, $2,260,000 and sewers in Phoenix, Ariz., $352,000 and Enfield, Conn., $350,000. Streets and roads contracts lead all other classifications, amounting to $6,310,000.

New productive capital issues of the week aggregate $12,369,000, of which $6,218,000 is PWA allotments. New PWA allotments aggregate $13,685,000, but reductions in previously announced loans and rescinded loans amount to $7,467,000. Chief among the PWA allotments is the $3,500,000 loan and grant to Denver for completion of its water supply diversion through the Moffat tunnel pioneer bore.

CONTRACTS

(Thousands of Dollars)

	Weekly Average Nov. 1933	Prev. 4 Weeks	Week Nov. 15 1934
Federal Government	$10,554	$4,235	$1,340
State and municipal	14,238	18,271	16,257
Total public	$24,792	$22,506	$17,597
Total private	4,739	4,307	3,746
Week's total	$29,529	$26,813	$21,343
Cumulative to date: 1933	$904,698	1934	$1,123,813

NEW PRODUCTIVE CAPITAL

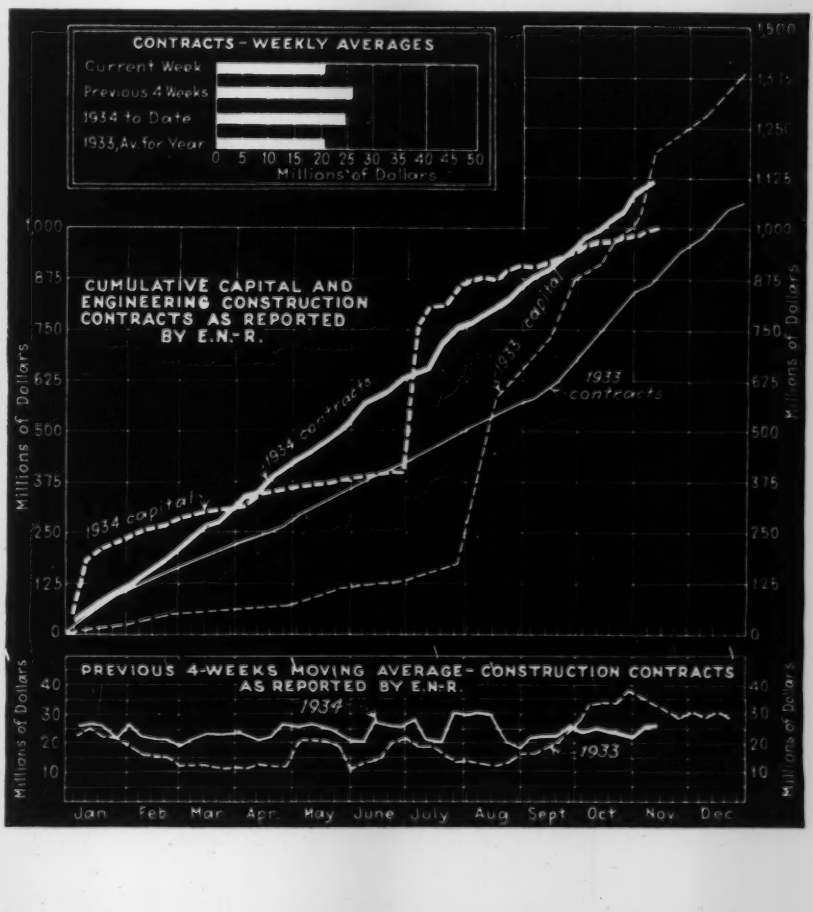
(Thousands of Dollars)

1934	Week Nov. 15	Cumulative
State and municipal	$6,151	$292,189
PWA allotments, S&M	6,218	613,081
RFC loans, S&M	....	25,463
Corporate issues	....	18,256
PWA allotments, private	....	57,022
Total, Non-Federal	$12,369	$1,006,011
PWA allotments, Federal Constr.	....	193,525
Total new capital	$12,369	$1,199,536
Cumulative to date: 1933	$1,213,220	1934 $1,006,011

Note: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for Federal construction.

INDEX NUMBER

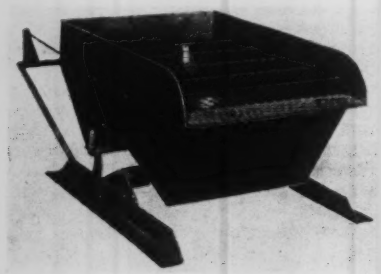
E.N.-R.- Cost	1913 = 100	1926 = 100	E.N.-R.- Volume	1913 = 100	1926 = 100
Nov., 1934	201.36	96.76	Oct., 1934	98	43
Oct., 1934	200.86	96.55	Sept., 1934	101	44
Nov., 1933	190.14	91.40	Oct., 1933	162	71
1933 (Av.)	170.18	81.80	1933 (Av.)	102	45
1932 (Av.)	156.97	75.45	1932 (Av.)	127	56
1931 (Av.)	181.35	87.17	1931 (Av.)	220	96.5


CONTRACTS - WEEKLY AVERAGES
Current Week
Previous 4 Weeks
1934 to Date
1933, Av. for Year
0 5 10 15 20 25 30 35 40 45 50
Millions of Dollars
CUMULATIVE CAPITAL AND ENGINEERING CONSTRUCTION CONTRACTS AS REPORTED BY E.N.-R.
1934 capital
1934 contracts
1933 capital
1933 contracts
Millions of Dollars
0 125 250 375 500 625 750 875 1,000
PREVIOUS 4-WEEKS MOVING AVERAGE - CONSTRUCTION CONTRACTS AS REPORTED BY E.N.-R.
1934
1933
10 20 30 40
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec

Construction Equipment and Materials

New Gyratory Screen

A new all purpose screen, known as the gyratory screen, is announced by the Beardsley & Piper Co., Chicago, Ill. The manufacturer claims many advantages for this type of screen. It operates with a combination of circular, vertical, oblique



Beardsley & Piper Co.'s gyratory screen

and forward and backward movement. It has a large capacity per square foot of screen area. It eliminates crushers and lump breakers. No vibration is imparted to adjacent superstructure. Head room, length and width are reduced to a minimum.

Settling Tank Uses Number of Shallow Compartments

Super-Settler is the name given by the International Filter Co., Chicago, Ill., to its new development in the field of sedimentation tanks. Separation of settleable solids from water or trade waste is by sedimentation as the water flows continuously through a number of shallow compartments, each of which is provided with a collector for the clear fluid, and mechanism for the continuous, automatic removal of the precipitated solids.

Super-Settler introduced by International Filter Co. The illustration shows the settling tank operating in conjunction with the same company's mechanical mixing device which is designated Super-Mix.

A rectangular tank is employed, usually of reinforced concrete. A vertical partition wall separating the inlet canal and the settlement compartment is built through the tank adjacent to one side and parallel with the longest dimension. The larger portion of the tank thus divided is separated horizontally into a number of shallow settling compartments by the installation of trays, from which the solids settle while the water is flowing through.

Flow from the inlet canal is equally divided between all compartments by longitudinal slots through the partition walls. These slots are at the bottom of each compartment and extend practically the entire width of the tank.

Each compartment has its individual outlet pipe extending across the tank width ("width" refers to the longer dimension of the tank). Inlet openings, closely spaced, are formed in the top of the pipes which are connected to outlet branches, one branch from each compartment leading to an individually controlled chamber in the outlet canal.

A sludge scraper arm attached to upright is inserted through each inlet slot and extends across the length of the tray. These arms are moved slowly back and forth across the width of the tank by a motor driven carriage, and move the sludge ahead of them to the ends of the trays where it passes over aprons into the sludge compartments.

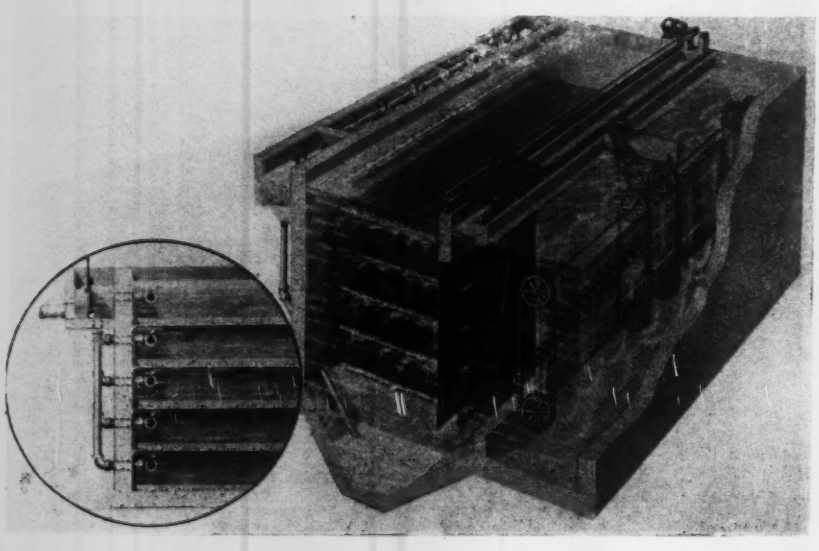
New Publications

PLUNGE IN PURITY WITH SAFETY, Everson Filter Co., Chicago, Ill. 8½x11, 12 pages. Contains information on the operation and hygienic control of swimming pools.

HEAVY DUTY FLOORS, International Cement Corp., New York, N. Y. 8½x11, 12 pages.

WINTER CONSTRUCTION, International Cement Corp., New York, N. Y. 8½x11, 12 pages.

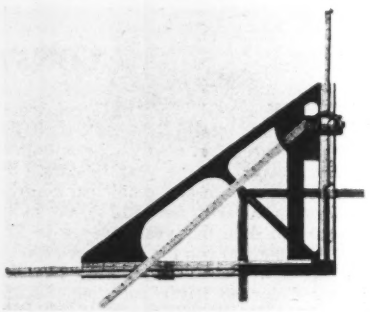
WATERTIGHT CONCRETE, International Cement Corp., New York, N. Y. 8½x11, 12 pages.



Mechanical Calculating Device Solves Algebraic Equations

A calculating device termed the Trianalyst, of advantage in solving a large variety of algebraic equations within sufficiently close limits to meet the ordinary requirements of engineering calculations, has been devised and patented by Barrett R. Wellington, Troy, N. Y.

The device provides a swinging hypotenuse associated with fixed and sliding scales which cooperate to define a right triangle, and is provided with a sliding square arranged to move along the bisector of the right angle of the triangle. The legs of this sliding square cooperate with the adjoining portion of the hypotenuse and the other sides of the large triangle to define smaller triangles, so that the apparatus in effect defines a large right angle and two small right angles similar to each other and to the large triangle, as well as a square. The geometric attributes of this figure are utilized by the device.



Trianalyst, a mechanical calculating device.

The inventor states that the device is advantageous in solving a large variety of algebraic equations such as cubic equations or equations involving higher powers of unknown quantities, certain types of quadratic equations, simultaneous equations and equations providing various involved expressions.

New Equipment in Brief

Welding Set. General Electric Co., Schenectady, N. Y., has announced the WD-30 line of portable arc welding sets. Each welder is a self-contained unit, having no external reactor, resistor, or separate exciter.

Diesel Cranes. The Industrial Brownhoist Corporation, Cleveland, Ohio, announces the new No. 8 Industrial Brownhoist 35-40 ton diesel crane. It has been designed throughout for diesel or gas power. The manufacturer states that it is very quiet in operation. It is equipped with three-speed travel mechanism so arranged as to have only the travel gears turning when the crane is traveling.

Brick Machine. The W. E. Dunn Mfg. Co., Holland, Mich., announces the new Junior Dunbrik machine for the production of a new type of high-grade low-cost concrete brick. The machine is designed to produce 1,500 bricks per hour. It is built with a heavy steel frame, electrically welded. The brick are produced in a series of all-steel mold boxes in the form of a continuous train which passes under an open bottom-feed hopper.

CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

Calif., Lincoln—Plans surveys for installation of water filter plant.

Calif., Los Angeles—Bd. Directors Metropolitan Water Dist., F. E. Weymouth, engr., 306 West 3rd St., rejected bids Oct. 31, Schedules 20K, 21, 22, 23 and 23A, construction of cut and cover conduit, precast and monolithic siphons, steel pipe siphons and appurtenant works of Colorado River Aqueduct in Riverside Co. Will readvertise. Noted Nov. 8.

Calif., Santa Barbara—City, V. E. Trace, water supt., City Hall, defeated $800,000 bonds for water development work, incl. $245,000 for La Mesa and El Cielito Reservoirs and $160,000 for filtration plant at Sheffield Reservoir.

Calif., Tracy—City plans survey for diesel energy for operation of pumps at municipal water plant and lighting plant.

Colorado—Bd. Water Comrs., acting for City and County of Denver, signed contract with P.W.A. for $2,700,000 loan and $800,000 grant, total of $3,500,000 for enlargement of Moffat Tunnel pioneer bore and other construction for increased water supply for Denver, incl. construction of 2,200 ft. tunnel on western side, lining 6.2 mi. Moffat Pioneer bore with concrete and constructing 5 short tunnels aggregating 7,600 ft. length out of South Boulder Creek on eastern slope. There will be conversion dam, involving removel of 90,000 cu. yd. constructed on eastern side, along with 5 siphons of total length of 6,500 ft., other work will include 1,300 ft. flumes and 15,000 ft. of canal line. Bids will be ready in a month. Noted Nov. 1.

Conn., Wallingford—Borough retained H. W. Taylor, engr., 9 Park Pl., New York, to make preliminary surveys for water supply project. Noted May 3.

Idaho, Clarks Fork—City, c/o W. Brashers, clk., voted bonds to secure $56,000 P.W.A. loan to construct earth diversion dam, installing 24,000 ft. 10 in. wood pipe, to connect dam with city distribution system. A. Tiggle-beck, Sandpoint, engr.

Ky., Wingo—City plans complete waterworks system, incl. well, pumps, canal standpipe, chlorinating equipment and distribution system, $36,000. J. S. Watkins, Lexington, engr. Noted Nov. 1.

Ky., Worthington—Town plans making application to P.W.A. for funds to finance construction water distribution system. State P. Service Comn. issued certificate of public necessity and convenience to enable town to install same.

La., Franklinton — City, election Dec. 3, sinking artesian well or wells sufficient to insure an adequate supply of water and for further purpose of extending and maintaining present waterworks system. Noted Aug. 17.

Mass., Middletown—Town Water Bd., indefinitely postponed construction water filtration plant. L. D. Thorpe, 6 Beacon St., Boston, engr. Noted Oct. 18.

Minn., International Falls—City voted $125,000, constructing waterworks system, incl. 4½ mi. 20 in. c.i. pipe for intake pumping plant, watertower, chlorinator. Total $170,000. $50,000 P.W.A. funds allotted. Toltz, King & Day, 1510 Pioneer Bldg., St. Paul, engrs. $170,000. Noted Feb. 18.

Minn., Rochester—City plans c.i. mains replacing mains of smaller capacity, brick up exterior of standpipe, enclosing with brick, existing 1,500,000 gal. reservoir. $80,000. C. Armstrong, city engr.

Mont., Ekalaka—City voted bonds to secure $36,000 P.W.A. loan for waterworks system. R. N. Stewart, Miles City, engr. Noted Sept. 13.

Mont., Hot Springs—City plans waterworks system. $41,000 allotted by P.W.A. T. A. Taschereau, Kalispell, engr. Noted June 8.

Mont., Thompson Falls—City retained H. Hulburt, engr., Thompson Falls, to make preliminary survey waterworks system. $50,000. Noted Aug. 9.

N. M., Deming—City soon takes bids 8,600 lin.ft. 6 in. c.i. watermains, appurtenances, and furnishing, erecting, installing 400,000 gal. steel water tank, 100 ft. above ground. A. J. Noyes, supt. Water Dpt. Noted Feb. 15.

N. M., Taos—City making plans deep well pumping plant, 200,000 gal. storage facilities 2- to 8-in. mains P.W.A. project. E. Harrison Thwaits, 357 Lafayette St., Denver, Colo., engr.

N. Y., Buffalo—Erie Co. Park Comn., County Hall, Buffalo, plans improving water supply systems at county parks, $6,520; purchase of materials for oiling and repairing county park roads, $7,500; tennis courts at Emery and Chestnut Ridge Parks, $2,500; comfort stations at Chestnut Ridge Park, $2,000. Total est. $18,520.

N. Y., Medina—Village Bd. revising plans and will soon submit another project to voters for constructing water supply system, $755,000. Noted Aug. 30.

N. Y., Olean — Municipality preliminary studies for water supply system utilizing wells, $15,000. N. S. Hill, 112 East 19th St., New York, engr. Noted Aug. 23.

O., Cambridge—City, L. Madison, serv. dir., soon takes bids concrete water supply reservoir, $15,000.

O., Danville—Municipality plans new waterworks system in village, $40,000. P.W.A. project.

O., East Canton—Municipality plans complete waterworks system, incl. drilling wells, erecting pumping unit, 100,000 gal. elevated storage tank, 3½ mi. distributing mains and fire hydrants, $57,000. Election Nov. 6, $10,000 bonds for same. P.W.A. granted $13,500 toward cost. R. M. Rice, Canton, engr.

O., Holland — Village, C. G. Price, mayor, soon takes bids waterworks system, $31,000. P.W.A. project. Bond issue of $10,000 approved. G. Champe & Associates, 1025 Nicholas Bldg., Toledo, engrs.

Okla., Ardmore—City defeated $27,000 bonds, for filtration plant. P.W.A. project. S. Mathews, Ardmore, engr. Noted Dec. 28.

Tex., Artesian Gardens (Somerset P.O.)—City preliminary plans, building complete waterworks system, incl. deep well, pumping unit, steel tank and tower, distributing lines, fire plugs, etc.

†Tex., Fort Ringgold—Con. Q.M., Fort Brown, plans improving water system, incl. c.i. pipe and pumping unit, road building, $35,000.

Tex., Goose Creek—City, c/o C. R. Myers, mayor, defeated $28,000, for water and sewer extension. D. M. Duller, 2nd Natl. Bank Bldg., Houston, engr., P.W.A. project. Noted July 12.

Tex., Handley—Tarrant Co. Water Control & Impvt. Dist. 2, c/o Dr. W. C. Foster, election Dec. 3, $124,000 complete water system with well, elevated tank, pumping equipment, fire hydrants and distribution system, $135,000. P.W.A. project. Hawley, Freese & Nichols, Capps Bldg., Fort Worth, engrs. Noted Oct. 4.

Tex., Morgan—City, c/o C. M. Buil, mayor, voted $15,000 for purchase of existing water system, new tank pipe lines, hydrants, etc. P.W.A. project. Est. $16,000. J. Rady, 400 Majestic Bldg., Fort Worth, engr. Noted Oct. 18.

Tex., Olney—City, E. Hill, mayor, expects to complete plans and take bids about February, 1935, for waterworks improvement, incl. raising dam and spillway, 2-3 mi. 10 in. supply mains, concrete settling basin, pumping station, 200,000 gal. elevated storage tank, probably steel, $123,000. P.W.A. loan and grant approved. Montgomery & Ward, Harvey-Snider Bldg., Wichita Falls, engrs. Noted Nov. 1.

Vt., Manchester—Municipality, retained H. W. Taylor, engr., 9 Park Pl., New York, to make preliminary surveys waterworks. Owner will build with day labor and separate contracts.

Ont., Toronto—City, Dpt. of Wks., plans replacing water-main, $3,025; replacing stop cocks boxes and rods, $37,625; removal of services, $5,375; providing 500 hydrants with new drainage, providing 150 valve chamber covers, repairing sludge valves in hydrants, $44,500. Soon takes bids for some of above items, remainder will be done by day labor under Comm. of Wks.

BIDS ASKED

Ill., Crotty — Nov. 27, by Village, M. J. Hogan, mayor, constructing waterworks, $12,000. Wells Eng. Co., Court House, Geneva, engr. Noted Aug. 30.

Ill., Dongola—Dec. 4, by City, L. Dodd, mayor, waterworks, $48,000. P.W.A. project. Warren & Van Praag, Inc., Millikin Bldg., Decatur, engrs.

Ind., Hammond—Dec. 3, by Bd. Trustees Dpt. Waterworks, constructing plant structures, Div. A; piping and filter equipment, Div. B; gate valves, Div. C; pumping equipment, Div. E; electrical work, Div. F. $700,000 loan and grant allotted by P.W.A. F. A. Blocker, 5941 Calumet Ave., Hammond, ch. engr. Noted Aug. 9.

Massachusetts—Dec. 6, by C. G. F. Coker, treas. Salem-Beverly Water Supply Bd., C. Ross, chn., City Hall, Salem, furnishing, installing pumping equipment and appurtenances in connection with waterworks construction. To exceed $1,000. Metcalf & Eddy, 1300 Statler Bldg., Boston, engrs.

Mich., Detroit—Nov. 20, by Dpt. Water Supply, 735 Randolph St., raw water sample pump and sump pump in shaft at stub end of raw water tunnel, Springwells Station; 100 gear housing assemblies for 24 in. gate valves for Detroit distribution system. P.W.A. project. G. H. Fenkell, 735 Randolph St., engr. Noted June 14.

N. Y., New York—Nov. 19, by Dpt. Water Supply, Gas & Electricity, Municipal Bldg., two 72 in. steel watermains and appurtenances in Central Park and in 5th Ave. adjacent to Metropolitan Museum of Art.

Okla., Chocotah — Nov. 26, by City, R. Houston, clk., City Hall, constructing Onapa Dam and Pump Station, Contr. 1, pumping equipment Contr. 2, and reservoir repairs, Contr. 3, incl. 1,400 sq.yd. rip rap, 17,000 cu. yd. excav., 482 cu.yd. concrete and 34,000 lb. steel. Burns & McDonnell Eng. Co., 107 West Linwood Blvd., Kansas City, Mo., engrs. Noted Nov. 8.

Tex., Lindale—Dec. 4, by City, c/o M. H. York, mayor, waterworks and sewerage system, incl. elevated tank, wells, pumps, distribution system, sewer collecting system with treatment plant, $57,000. P.W.A. project. Montgomery & Ward, Harvey-Snider Bldg., Wichita Falls, engrs. Noted Sept. 27.

Tex., Whitesboro—Nov. 23, by City, c/o F. Suggs, secy., waterworks improvements, incl. deep well, pump house, steel pipe, distribution system, $15,000. **P.W.A.** F. J. Von Zuben, 820 Fair Bldg., Fort Worth, engr. Noted Nov. 8.

B. C., Saanich—See "Contracts Awarded."

CONTRACTS AWARDED

Ala., Vincent—City, waterworks, incl. 6,500 ft. 6 in. mains and building foundation for tank, to H. McMath, Columbus, Ga., $18,894; tank on tower, to Cole Mfg. Co., Newman, Ga., $5,925. **P.W.A.** Bids Oct. 19. Noted Oct. 16.

Ariz., Wickenburg—City, new pipe line, to Fisher Co., Phoenix, $15,505***extending service lines, to Arizona Concrete Co., Phoenix, $2,002***new wells, to O. H. Ensign, Phoenix, $1,400. Grand total $18,907. **P.W.A.** Bids Oct. 10.

Ark., Leachville — O. O. Stires, recdr., well and pumphouse for waterworks, to Lane Constr. Co., Lane. **Correction**—(Contractor for well and pumphouse. Noted Nov. 1, under "Contracts Awarded."

Calif., Brawley—City Council, water filtration plant, watermains, etc., to M. Matick, 1269 East Colorado Blvd., Los Angeles, $95,672*** elevated steel tank, to Chicago Bridge & Iron Wks., 608 South Hill St., Los Angeles, $23,790. **P.W.A.** Bids Sept. 17, awarded Oct. 31.

Calif., Los Angeles—Bd. Directors Metropolitan Water Dist., F. E. Weymouth, engr., 306 West 3rd St., to J. F. Shea, Inc., Mecca, Schedule 18, cut and cover conduit and appurtenant works, Sta. 9289, plus 29 to Sta. 9661 plus 80; length 26,914 ft., and Schedule 18A, 2 circular monolithic siphons and appurtenant works, 12 ft. 4 in. diam., total length 650 ft. long, $874,359; Schedule 19, cut and cover conduit and appurtenant works, Sta. 9682 plus 40 to Sta. 10,138 plus 50, total length 35,229 ft. long, $1,113,757; Schedule 19A, 1 circular monolithic siphon and appurtenant works, siphon diam. 11 ft. 5 in. 2,235 ft. long.

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Federal Government projects are classified under heading denoting type of work and designated by symbol of †

◆

†*Federal Government.*

For official proposal advertising see Searchlight Section

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Readers of *Engineering News-Record* are vitally concerned with every phase of the jobs indicated in these pages—they are men who do things and men who buy things, in the civil engineering and construction field.

Waterworks, etc. (Continued)

$77,170; Schedule 20, 2 portions of a circular monolithic concrete siphon and appurtenant works, 12 ft. 4 in. diam., 18,561 ft. long, $545,918. Grand total $2,611,204. Above in connection with cut and cover conduit siphons, etc., of Colorado River Aqueduct. Bids Oct. 31. Noted Nov. 8.

Colo., Colorado Springs—E. Mosley, city mgr., Crystal Creek Dam, incl. building 272,000 cu. yd. earth fill, 7,300 cu.yd. rock rip rap on downstream side, 63,000 cu.yd. excav., to be 117 ft. high, 800 ft. long, with 22 ft. roadway on top, to Ed. Honnen Constr. Co., Independence Bldg., Colorado Springs, $228,615; installing 640 tons electric-welded copper-bearing steel plate ¼ in. thick, supported on steel angle irons anchored in dam, to American Bridge Co., 208 South La Salle St., Chicago, Ill., $64,620. Part P.W.A. project. Bids Oct. 26. Noted Oct. 11.

Colo., Manitou—City Council, furnishing 2,100 ft. 16 in. and 4,400 ft. 14 in. steel pipe for pipe line extending from water system intake to town, to Thompson Mfg. Co., 3001 Larimer St., Denver, $13,000. **P.W.A.** Bids Oct. 5.

Ill., St. Elmo—City, 27,655 ft. 2- to 8-in. c.i. mains, 16,080 lbs. c.i. specials, 42 hub end gate valves, 23 fire hydrants, 5,500 ft. ¾ in. copper tubing service connections, dam and reservoir, 2 chemical feed machines without solution tank, 1 chlorinator, one 990 g.p.m. wash pump, two 225 g.p.m. low service pumps, one 500 g.p.m. fire pump, two 4 in. rate of flow controllers, one floodulator, 2 flash chemical mixing devices, 2 loss of head gages, one recording pressure gage, and set of laboratory equipment, to C. J. Moritz, Effingham, $60,743, using machines for excavation. Est. $65,210. **P.W.A.** Bids Oct. 31.

Ky., La Center—City Council, waterworks, Contr. 1, distribution system, hydrants, meters, services and pump houses, to O. V. Arnett, Berea, $19,225***Contr. 2, 2 wells, one 125 gpm. and one other 250 gpm. capacity equipped with pumps, to Layne Central Co., Chelsea Ave., Memphis, Tenn., $6,480***Contr. 3, 75,000 gal. steel tank on 100 ft. tower, to W. E. Caldwell Co., 200 East Brandeis St., Louisville, $6,692. Grand total $32,397. **P.W.A.** Bids Oct. 23.

Mass., Somerville—City, J. E. Mullaney, engr., City Hall, furnishing, laying, relaying 8 in. and up c.i. mains in Porter, Crown, Kimball, Lowell, Glen and Joy Sts., to Anthony Ross & Son, 97 Bedford St., Lexington, $33,608. **P.W.A.** Bids Oct. 24, awarded Nov. 1. Noted Oct. 18.

Mich., Detroit—Dpt. Water Supply, 735 Randolph St., electric load indicators for Springwells Plant, to General Electric Co., 700 Antoinette St., $1,940***2 flue gas temperature recorders for Boilers 1 and 2, to C. J. Tagliabue Mfg. Co., 2832 East Grand Blvd., $402 ***relay transmitting elements for long distance pressure gages, to Bailey Meter Co., 7511 Kentucky Ave., Dearborn, $1,320***window and door screens, laboratory building, to Squier Screen Co., 4801 Garland Ave., $733. Grand total $4,395. **P.W.A.** Noted Oct. 4.

Mo., Carthage—City, filter equipment, to E. W. Bacharach & Co., Rialto Bldg., Kansas City, $16,650***wash water tank, to Chicago Bridge & Iron Co., 37 West Van Buren St., Chicago, Ill., $3,280***general construction work, to Kaiser-Ducett Co., Kansas City, $75,500. Grand total $95,430. Est. $107,000. **P.W.A.** Bids Oct. 24. Noted Oct. 18.

Mo., St. Charles—City, 2 story, 70x80 ft., rein.-con., brick water filtration plant building, filter equipment and improving waterworks plant, to A. H. Stiel, Inc., 813 Chestnut St., St. Louis, $78,480. Est. $65,000. **P.W.A.** Bids Oct. 29, awarded Nov. 7. Noted Oct. 25.

N. H., Durham—Town, and Bd. Trustees University of New Hampshire, water supply system, from Oyster River, incl. gate house, filter house, filtration plant, pumping equipment, controls, meters, etc., filling, grading 8x12 ft. gate house, 26x49 ft. filter house, 21x31 ft. filtration plant, brick and concrete construction, to Davison Constr. Co., 36 Lowell St., Manchester, $54,000. Bids Nov. 1, awarded Nov. 8.

N. Y., Bethlehem—Municipality, 500 tons 10 in. c.i. waterpipe, to U. S. Pipe & Fdry. Co., Burlington, N. J. Est. about $17,500. Noted Oct. 11.

O., Carey—Chesapeake & Ohio R.R., Baltimore Trust Bldg., Baltimore, Md., water treatment plant, to Railroad Water & Coal Handling Co., 608 South Dearborn St., Chicago, Ill. Est. $35,000.

Tex., Fairfield—City, c/o H. L. Williford, mayor, general contract waterworks, to Lytle & Humphreys, 510 Securities Bldg., Omaha, Neb., approximately $45,000***water well and pump, control equipment and fire pump, to Layne-Texas Co., 6931 Hsbg., Houston, $7,845 ***supplying two 250 gal. service pumps, to A. M. Lockett & Co., Magnolia Bldg., Dallas, $736***100,000 gal. elevated steel tank on 75 ft. tower and 100,000 gal. concrete surface tank, to Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill., $9,680 and $3,770 respectively. Grand total $67,031. Above awards subject to P.W.A. approval. Noted Oct. 18.

Tex., Hearne—City, c/o W. H. Ely, mayor, waterworks improvements, new wells, tank and tower, distributing lines, meters, etc., general contract, to Chamberlain & Strain, Nat. Bldg., San Antonio, $9,080***deep well, Layne-Texas Co., 6931 Hsbg. Houston, ***150,000 gal. elevated tank, to P. Des Moines Steel Co., Praetorian Bldg., $14,200, all foregoing tentatively. Grand total $34,210. **P.W.A.** Bids [illegible] Noted Sept. 27.

Vt., Manchester—See "Proposed W[illegible]

B. C., Saanich—Municipality install[illegible] water system, incl. 9,200 ft. 6 and 8 [illegible] and 4,000 ft. 2 in. galvanized pipe, [illegible] and fourteen 6 in. hub-end gate valv[illegible] water tank, in Little Mountain Dist., d[illegible] under supervision H. H. Allen, engr., Royal Oak, Vancouver Island. $20,000.

Sask., Regina—R. C. M. Police, installi[illegible] trenches, etc., at R. C. M. Police Barr[illegible] Vagg, Wilson & Co. Ltd., Regina, $4,705. Noted Oct. 12.

SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

Ark., Hot Springs—City making plans [illegible] age disposal plants, $300,000. Black & [illegible] 700 Mutual Bldg., Kansas City, Mo., en[illegible]

Conn., Berlin—State preliminary surv[illegible] for sewage treatment plant and sewer mains. To exceed $25,000. Doman Sanitary Eng. Co., J. Doman, 44 Selleck Ave., East Norwalk.

Conn., Unionville—Town, indefinitely postponed construction sanitary sewer mains and disposal plant. Est. $230,000. T. F. Hew[illegible] 110 William St., New York, N. Y., engr. Noted May 24.

Ind., Kokomo—City making plans sewage disposal plant, $50,000. P.W.A. application approved. G. Mix, Kokomo, engr. Noted Feb. 15.

Ind., Monticello—City Council plans constructing sewage plant.

Kan., Hays—City sewage disposal plant, $65,000. P.W.A. loan and grant approved. F. E. Archer & Co., 619 New England Bldg., Kansas City, Mo., engrs. Noted Mar. 8.

Md., Federalsburg—City soon takes bids sewers and sewage treatment plant, $34,000. P.W.A. project. F. Dryden, Salisbury, engr. Noted Oct. 25.

Mass., Worcester—City, Sewer Dpt., [illegible] sewers in Massasoit Rd. and Indiana Ave., $17,500; Providence St., $15,000; Boynton and Elbridge Sts., $11,900; Malden St. and Holly Rd., $11,880; South Ludlow and James Sts., $20,000; Belmont St., $19,400; Radnor St., $1,500. Total est. $96,780. P.W.A. will provide $56,280 funds of above amount. R. G. Linsley, city engr.

Mo., Pilot Grove—City withdrew application for $4,200 grant and $18,000 loan from P.W.A. for sanitary sewers. Project postponed indefinitely. W. B. Rollins & Co., 339 Railway Exch. Bldg., Kansas City, engrs. Noted Dec. 28.

N. Y., Brocton—Village bids early in 1935 sewerage system and disposal plant, $134,000. P.W.A. project. Hill & Hill, North East, Pa., engrs. Noted Aug. 23.

N. C., Raleigh—City soon takes bids 2 sewage disposal plants, 1 on Walnut Creek and other on Crabtree Creek. $500,000. P.W.A. project. Guggenheim Bros., 120 Bway., New York, engrs.

O., Columbus—W. J. Lucks, dir. Serv., modifies plans Contr. 9, intercepting sewers, involving 3,400 ft. 54 in. rein.-con. pipe, 3 regulator chambers, 12, 15 and 20 ft. deep open trench, $100,000. P.W.A. project. P. W. Maetzel, City Hall, engr.

O., Willard—Municipality, soon takes bids sewage disposal plant. $195,000 P.W.A. loan approved. Jennings & Lawrence, 12 East 3rd St., Columbus, engrs. Noted Oct. 25.

Okla., Ardmore—City voted $34,000 sewage plant. S. Mathews, Ardmore, engr. Noted Aug. 23.

Tex., Goose Creek—See "Waterworks."

Wash., Seattle—Bd. P. Wks., City Hall, soon takes bids constructing Seward Park Sewer, $137,000, Laurelhurst Trunk Sewer $389,000 and Ballard Sewer $321,000. Total est. $847,000. P.W.A. project. T. R. Reeman, city engr. Noted Oct. 25.

BIDS ASKED

Minn., St. Paul—Nov. 26, by Minneapolis-St. Paul Sanitary Dist., M. Rosen, secy., 1923 University Ave., constructing Contr. 107, Div. C, Job 320, 1,441 lin.ft. 13 ft. 4 in. circular section tunnel, and 4,229 lin.ft. 11 ft. 9½ in. circular section tunnel, transition chamber, 5,690 lin.ft. 24 in. sub-drain pipe. $450,000. C. C. Wilbur, c/o owner, engr.

N. C., Spindale—Nov. 22, by Town, S. E. Elmore, mayor, constructing sewer outfalls and sewage disposal plant, Sect. 1, involving 6,800 ft. 6- to 12-in. vitr. clay pipe, 300 ft. 8- to 12-in. c.i. pipe, 30 manholes, Sect. 2, 1.2 m.g. earth collection basin, 600,000 g.p.d. disposal plant, etc. $62,000. P.W.A. project. Harwood Beebe Co., Spartanburg, S. C., engrs. Noted July 19.

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†*Federal Government.*

Sewerage, etc. (Continued)

O., Cleveland—Nov. 23, by City, four rein.-con., 50x50 ft. sludge digestor tanks, 4,500 cu.ft. capacity, with piping and equipment. P.W.A. project. $150,000. G. B. Gascoigne, 1140 Leader Bldg., engr.

O., Columbus—Nov. 20, by W. J. Lucks, dir. Serv., intercepting sewer, Contr. 9, involving 3,400 ft. 54 in. rein.-con. pipe 3 regulatory chambers, 12-15-20 ft. deep open trench. $100,000. P.W.A. project. P. W. Maetzel, City Hall, engr.

Pa., Farrell—See "Contracts Awarded."

South Carolina—Nov. 20, by State Hy. Dpt., Columbia, clearing, grubbing, etc., 6.904 mi. Route 78, NRH 168, Sect. 2, and NRH 194, Orangeburg and Dorchester Counties, $105,000; bituminous surfacing 4.419 mi. Route 63, NRS 368 and Ext., Sects. 1 and 2, Hampton Co., $50,000; 4.294 mi. Route 22, NRH 265-B, Sect. 1, Fairfield Co., $50,000; 6.126 mi. Route 163, NRS 329-C, York Co., $48,000; 6.231 mi. Route 33, NRH 346, Sect. B, Jasper Co., $77,000; 4.507 mi. County Road, NRS 384, Greenwood Co., $40,000; widening, repairing 73 ft. rein.-con. steel bridge over Fishing Creek and 181 ft. existing treated timber bridge over Allison Creek, Route 163, between York and North Carolina state line, NRS 329-B, York Co. $10,000.

Tex., Port Lavaca—Nov. 27, by City, c/o F. M. Dudgeon, mayor, constructing complete sanitary sewerage system, with treatment plant, incl. 39,400 ft. 4- to 12-in. vitr. clay and 350 ft. 6 in. c.i. pipe, sewage pump, meter, etc., $52,000. P.W.A. project. J. C. McVea, 1318 Kipling St., Houston, engr. Noted Sept. 27.

Ont., Ottawa—See "Contracts Awarded."

CONTRACTS AWARDED

Ariz., Phoenix—City, 280,933 lin.ft. 6- to 21-in. sewer extensions, to Drainage Constr. Co., c/o E. E. Thibodo, Lynwood, Phoenix, $352,-150. **P.W.A.** Bids Oct. 18.

Calif., Los Angeles—City, Bd. P. Wks., sanitary sewer construction with force main and clarifier connections for Terminal Island Outfall Sewer, 164.88 ft. 30 in. and 82.74 ft. 20 in. c.i. sewer, concrete footings, to Artukovitch Bros. Co., & Babek & Brkich, 4928 West Blvd., $5,055; 60.55 ft. 30 in. vitr. clay str. pipe sewer extension and 496 ft. 30 in. c.i. sewer, to F. W. Weber, Southgate, $19,600. Bids Oct. 24, awarded Nov. 7. **P.W.A.** L. Aldrich, City Hall, engr.

Conn., Enfield—Town, trunk line sewer and disposal plant, day labor. Est. $350,000. T. F. Bowe, 110 William St., New York, N. Y., engr. Noted Oct. 18.

Mass., Boston—City, Dpt. P. Wks., C. J. Carven, comr., City Hall Annex, concrete sewer lines in Cottage St., East Boston, to R. Zoppo, 44 Ramsdell Ave., Roslindale, $35,502, by machinery. **P.W.A.** Bids Oct. 29, awarded Nov. 8. Noted Oct. 25.

Mass., Braintree—Town, S. M. Ellsworth, chn. Sewers Comrs., Town Hall, furnishing vitr. clay pipe in connection with sewer construction, to Woodsum Coal Co., 38 Crescent Ave., Braintree***manhole castings, to Worcester Fdry. Co., 180 Prescott St., Worcester*** brick, to John J. Gallagher, Inc., 100 Federal Ave., Quincy***jute, to Chas. J. McCarthy Co., Inc., 272 Dorchester Ave., South Boston ***lumber, to Quincy Lumber Co., Pond St., Quincy***lime, to L. Grossman Sons, Inc., 130 Granite St., Quincy***asphalt jointing compound, to Eastern Clay Goods Co., 135 North Beacon St., Brighton. **P.W.A.** Bids Oct. 25, awarded Nov. 7.

Neb., Stuart—Village, sanitary sewerage system, disposal plant, iron pipe, manholes, flush, etc., to Lyall Landreth, Scottsbluff, $47,874. **P.W.A.** Bids Oct. 7.

N. Y., Malone—City, miscellaneous equipment for sewage project, Div. 4, to Hanna Porter Co., Malone, $4,998. **P.W.A.** Noted Mar. 29.

O., Cleveland—City, W. J. Rogers, dir. P. Utilities, City Hall, two 25,000 and three 40,000 cu.ft. per min. blowers and equipment for easterly sewage treatment plant at East 140th St. and Lake Erie, to Dravo-Doyle Co., 4800 Prospect Ave., $371,050. Awarded Nov. 7. **P.W.A.** Noted Jan. 11.

Pa., Farrell—City, storm sewerage system, day labor. LWD project approved. $125,000. J. A. Franck, mayor.

S. D., Sioux Falls—City, constructing 6,195 lin.ft. 18- to 36-in. sewers, 16 manholes, to C. A. Wagner Constr. Co., 267 Boyce Greeley Bldg., $24,449. **P.WA.** Bids Oct. 29.

Tex., Dallas—City, c/o E. Goforth, secy., open storm sewer channel, Oakland Ave. Dist. 19, from White Rock Creek to Marbury St., to F. Parrott, 3014 Canton St., $42,333. **P.W.A.** Bids Oct. 24. Noted Oct. 18.

Tex., Fairfield—City, general contract, 18,000 lin.ft. 10- to 18-in. concrete and vitr. concrete sanitary sewers, to Lytle & Humphreys, 510 Securities Bldg., Omaha, Neb., $41,592. Award subject to P.W.A. Noted Oct. 18.

Ont., Ottawa—City, relief concrete sewer in Elizabeth St., day labor. Est. $30,000. F. C. Askwith, City Hall, engr.

Ont., Ottawa—Secretary Bd. Control, concrete pipe relief sewer in Booth St. from Wellington to Spruce Sts. and Preston St., and King Edward Ave. from Laurier Ave. to Rideau St., Cumberland-Laurier and Osgoode Sts., to Keystone Constr. Co. Ltd., Windsor, $122,138 and $22,410 respectively est. $140,000 and $37,000 respectively***concrete pipe and tunnel sewer in Laurel St.-Champagne Ave. and Preston St. to Milk Constr. Co., Ltd., Montreal, Que., $40,000 est. $26,400***concrete relief sewer in Bronson, McLeod and Lyon Sts., to Mahoney & Rich, Bank St., $36,000 est. $87,000***Scott St. from Merton St. to Carruthers Ave., to McDonald Bros., Gloucester St., $9,945 est. $22,000. Grand total $230,493. Noted Mar. 1.

Ont., Welland—City program of relief work, incl. sewer extensions, road repairs and repairing concrete sidewalks, approved and work will be done under supervision C. L. Coulson, city engr. $35,000.

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

Calif., San Jose—Southern Pacific R.R., 65 Market St., San Francisco, W. H. Kirkbride, engr., making plans subway beneath tracks at Bird Ave.

Idaho, Nampa—State Hy. Dpt., Boise, soon takes bids constructing subway carrying U. S. Hy. 30 under railroad tracks. $200,000 allocated. P.W.A. project.

N. J., Paulsboro—State Hy. Comn., Trenton, making plans 90 ft. vertical lift span bridge over Mantua Creek. Ash, Howard, Needles & Tammen, 1010 Orear Leslie Bldg., Kansas City, Mo., engrs.

North Carolina — State Hy. and P. Wks., Raleigh, W. V. Baise, acting engr., plans overhead crossing at Marsden over Norfolk and Southern R.R., Project 1042, Beaufort Co., to exceed $35,000; 2 bridges east of Mansfield on Route 24, 1 bridge over Broad Creek, and other over Gales Creek, Project 2022, Carteret Co., to exceed $40,000.

North Carolina—State Hy. & P. Wks., Raleigh, plans 3 overhead bridges, 1 over Seaboard Air Line R.R., Project 6482, Lincolnton, Lincoln Co., $15,000; 2 overhead bridges in Wadesboro, Route 15, Anson Co., 1 over Seaboard Air Line, $12,000-$15,000, and other over Winston Salem Southbound R.R., $12,000 or $15,000. W. L. Craven, Raleigh, bridge engr.

Okla., Guthrie—City preliminary plans concrete viaduct over Atchison, Topeka & Santa Fe R.R. yards here. $140,000. W. Ritzhaupt, Guthrie, engr.

Texas—State Hy. Comn., J. Wood, chn., Austin, soon takes bids 0.359 mi. steel, concrete bridge over Double Mountain Fork of Brazos River and roadway approaches, Hy. 4, NRS 736 F, Stonewall Co.; also 0.783 mi. steel, concrete bridge over Pease River and approaches, Hy. 16, NRS 681-E, Foard and Hardeman Counties. $79,500. P.W.A. project.

Tex., Conroe—Montgomery Co., R. H. Weatherly, judge, election Nov. 17, $378,000 bonds for new bridge on old site. $492,000. W. F. Smith, Conroe, engr.

†Tex., Galveston—U. S. Eng., Trust Bldg., Galveston, plans bascule bridge over Galveston Bay, on Causeway, near here. $350,000.

BIDS ASKED

Georgia—Nov. 23, by State Hy. Bd., Atlanta, constructing 7 and repairing 1 bridge on hys. in Columbia, Camden, Dougherty, Wayne and Wilcox Counties.

Ill., Golden—Dpt. P. Wks. & Bldgs., Div. Hys., Springfield, taking bids 3 span 180 ft. steel girder and I-beam bridge, south of here. E. Lieberman, hy. engr.

Indiana—Nov. 20, by State Hy. Comn., Indianapolis, bridges at Hartsdale Junction, Lake Co.; over Salt Creek, 9 mi. north of Bedford, Lawrence Co.; over Chicago, Milwaukee, St. Paul & Pacific R.R., 0.2 mi. north of Bedford, Lawrence Co.; over Ryan Ditch, 3.5 mi. southeast of Newland, Jasper Co.; over Kent Ditch, 8 mi. east of Enos, Newton Co.; over Snake Creek, 3.4 mi. east of Eminence, Morgan Co.; on Road 41, 7 mi. north of Bloomingdale, Park Co.; temporary Bridge 27, over White River, 0.2 mi. north of Winchester, Randolph Co.

Iowa—Nov. 20, by State Hy. Comn., Ames, 2 corrugated pipe culverts, 12 concrete culverts, bridges on Primary Rd. 155, NRS-520-A, Adams Co.; 15 corrugated metal pipe culverts, 1 old corrugated metal pipe culvert, 3 rein.-con. box culverts on Secondary Rd., NRS-514-A, Guthrie Co.; 11 rein.-con. pipe and 4 rein.-con. box culverts, on Primary Rd. 18, NRH-94-Hancock and Kossuth Counties; wood box culvert on Primary Rd., east of Onawa, B-787, Monona Co.; 1 rein.-con. box and 1 rein.-con. arch culverts, 28 metal pipe culverts, on Secondary Rd., NRS-510-A, Monroe Co.; bridge over Tarkio River, NRS-518-G, Page Co. P.W.A. project. F. R. White, ch. engr.

Massachusetts—Nov. 20, by Commonwealth of Massachusetts, Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, plans replacing present concrete bridge by constructing Project PWA R-39, Docket 6245, 1 bid to include rein.-con. sub-structure, 17,170 sq.yd. bituminous macadam approaches, incl. necessary grading, filling; other bids to include furnishing, fabri-

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†*Federal Government.*

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Bridges, etc. (Continued)

cating and erecting steel superstructure, incl. steel grid and concrete roadway, there are two 60 ft. approach spans, two 90 ft. each spans and one 121 ft. center span over Boston, Revere Beach and Lynn R.R., Revere. To exceed $175,000.

Vermont—Nov. 23, by State Hy. Dpt., Montpelier, H. E. Sargent, ch. engr., replacing present bridge with 2 span steel I-beam bridge, with rein.-con. abutments, State Project 123 L, Route 10, Springfield, involving 303 cu.yd. rock excav., 750 cu.yd. common excav., incl. borrow, 13 cu.yd. sub base gravel approaches, 148 cu.yd. gravel surface course, 1,420 cu.yd. channel excav., 468 cu.yd. structure excav., 297 cu.yd. concrete, 31,795 lb. reinforcing steel, 155,628 lb. structural steel superstructure, 1 temporary bridge, etc. To exceed $30,000.

West Virginia—Nov. 20, by State Road Comm., Charleston, for Montgomery Bridge 1034, 870 ft. long, Kanawha and Fayette Counties.

Wisconsin—Nov. 27, by State Hy. Comm., Milwaukee, 2 bridges, Control, 5 structures Contr. 4, and 3 bridges, culverts on same road, Whitehall-Ettrick Rd., Hy. 53, NRM 120-B, NRH 120-A, and NRM 120-B, Trempealeau Co.

CONTRACTS AWARDED

Arizona—See "See "Streets and Roads."

Connecticut—See "Streets and Roads."

Illinois—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, fabricating steel superstructure Rock River Bridge, Whiteside Co., to McClintic Marshall Co., 400 North Michigan Ave., Chicago, $33,264***viaduct in Ogle Co., to Shappert Eng. Co., Belvidere, $17,903***2 bridges in Pulaski Co., to C. R. Miller & Sons, Inc., Decatur, $9,344. Grand total $60,511. Bids Oct. 31. Noted Oct. 11, under "Streets and Roads."

N. J., South Plainfield—Lehigh Valley R.R. Co., G. T. Hand, ch. engr., 143 Liberty St., New York, constructing grade crossing, to Delta Constr. Co., Hopewell. Noted Oct. 11.

New York—A. W. Brandt comr. Hys., Albany, bridges in Saratoga Co., to J. F. Starstron, Merrick, $13,460 est. $15,993***Delaware Co., to J. A. Spooner, Albany, $16,047 est. $18,309 ***0.55 mi. Chenango Co., to Utica Constr. Co., Inc., Utica, $96,651 est. $123,196*** Allegany Co., to W. L. Collins, Hornell, $49,020 est. $54,774***Niagara Co., to Cold Spring Constr. Co., Akron, $4,013 est. $4,736*** Allegany Co., to H. E. Bunce, Hornell, $97,113 est. $110,659. Grand total $276,304. **P.W.A.** Bids Oct. 9, 11 and 30.

Ohio—O. W. Merrell, dir. Hys., Columbus, reconstructing 5 span wood, steel truss bridge, by removal of 3 wood truss spans and substituting 3 steel calem-back truss spans and constructing new backwalls and capping 1 abutment, build 1 new pier and new realigned bridge to consist of Span "A" 153 ft., Span "B" 148.73 ft., Span "C" 146.7 ft., Span "D" 165.7 ft., and Span "E" 165.7 ft., on Sect. "A" Waverly-Zohn's Corners Rd., Pike Co., to Purdy Constr. Co., 173 West 2nd St., Mansfield, $44,976. Bids Oct. 26. Noted Oct. 18.

Ohio—O. W. Merrell, dir. Hys., Columbus, concrete slab bridge over Berry's Run, concrete slab bridge over Wilkes Run, timber bridge with steel beams over Captina Creek and steel girder bridge over Long Run, traffic bound macadam surface course paving 1.564 mi. Sect. "E" Barnesville-Powhatan Rd., Belmont Co., to A. W. Williams, Martins Ferry, $55,821. Bids Oct. 19.

Oregon—See "Streets and Roads."

Tennessee — State Dpt. Hys. and P. Wks., Nashville, constructing bridge and approaches over Little Emory River on State Hy. 61, NRS 287-B, Roane Co., to Hickman & Long Harriman, $26,391 **P.W.A.** Bids Nov. 2. Noted Oct. 25, under "Streets and Roads."

Vermont—See "Streets and Roads."

Wisconsin—State and Winnebago Co., 45 ft. I-beam bridge and 26 ft. submerged concrete deck bridge, also culverts, small bridges Winnebago Co., to Fluor Bros. & Smith, Inc., Oshkosh, $16,776 and $19,259 respectively. Bids Oct. 30. Noted Oct. 18.

STREETS AND ROADS

BIDS ASKED

Connecticut—Nov. 19., by J. A. Macdonald, state hy. comr., Hartford, waterbound macadam paving 8,350 ft. Roxbury Falls Rd., Route 131, Roxbury; Amiesite or Colprovia surfacing and gravel shoulders 6,600 sq.yd. Routes 75 and 190, Suffield.

Georgia—Nov. 23, by State Hy. Bd., Atlanta, grading, paving, 3 bridges on 25.67 mi. hys. in Wayne, Dougherty, Jackson, Barrow, Hall, Berrien, Muscogee, Dade, Clayton, Bibb and Columbia Counties.

Iowa—Nov. 20, by State Hy. Comm., Ames, paving 0.024 mi. F-139, U. S. Rd. 18, Hancock Co.; 0.384 mi. NRM 67-F, U. S. Rds. 20 and 65, Iowa Falls, Hardin Co.; 4.781 mi. Rd. 30, NRS 528-A, Harrison Co.; grading 4.472 mi. Primary Rd. 155, NRS 520-A, Adams Co.; 2.166 mi. Secondary Rd., NRS 514-A, Guthrie Co.; 4.558 mi. Rd. 18, NRH 94-AF, Hancock and Kossuth Counties; 6.698 mi. Secondary Rd., NRS 510-A, Monroe Co., all foregoing P.W.A. projects; bridge fill on Primary Rd. 165, west of Onawa, P-787, Monona Co., incl. 3,900 cu.yd. excav. not P.W.A.; graveling 2.174 mi. Primary Rd. 182, NRS 443, Allamakee Co.; 6.51 mi. Primary Rd. 73, NRH-NRM 379, Cherokee Co.; 15.32 mi. Primary Rd. 78, NRS 531-AB, Henry Co.; 1.25 mi. Primary Rd. 35, Lake View, NRM 423-AB, Sac Co., all foregoing P.W.A. projects; resurfacing M-386, Primary Rd. 5, Cherokee Co. not P.W.A. F. R. White, ch. engr.

Kentucky—Nov. 23, by State Hy. Comn., Frankfort, grading, draining 9.614 mi. Foree's Corner-Lane's Landing Rd., NRS 340-AG, Henry Co.; 7.32 mi. Uniontown-Spring Grove Rd., NRS 345-AG, Union Co.; high type surfacing 0.739 mi. 9th St., Russellville, NRH-M 202-DS, Logan Co.

Louisiana — Nov. 28, by State Hy. Comn., Baton Rouge, drainage structures and approaches on Lacasin-Welsh Hy., Project 3500-B, Jefferson Davis Parish, involving removal of existing structures and replacing with 1 concrete box culvert and 1 concrete deck girder bridge on concrete piles; grading, drainage stuctures and approaches 0.173 mi. Lafayette-Duson Hy., Project 3700-B, Lafayette Parish, involving removal of existing structures, and replacing with 1 concrete box culvert and 2 concrete deck girders on concrete piles.

Massachusetts—Nov. 20, by Commonwealth of Massachusetts, Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, bituminous macadam surfacing 7,167 ft. Project NRH 125-C, Bourne and Wareham, to exceed $50,000; bituminous macadam paving 29,750 sq.yd. and type "A" bituminous concrete paving 2,905 ft. Project NRH 176-B, Bourne, to exceed $75,000.

Mass., Boston—City, Dpt. P. Wks., C. J. Carven, comr., City Hall Annex, rejected bids sheet asphalt or bitulithic paving Walk Hill St., Mattapan. Will probably be readvertised. P.W.A. project.

N. Y., St. George—Nov. 21, by J. A. Palma, pres., Richmond Boro, Boro Hall, bituminous concrete repaving Bay St.; asphalt block repaving Victory Blvd.

N. Y., Salamanca—See "Contracts Awarded."

North Dakota—Nov. 23, by State Hy. Dpt., Bismarck, concrete paving 0.522 mi. road in Devils Lake, NRM 403AB and 19E, Ramsey Co.; oil mix paving 0.685 mi. in Hettinger, NRM 320A, Adams Co., incl. 4,902 cu.yd. excav.; 0.704 mi. Granville, NRM 274B, McHenry Co., 2,025 cu.yd. excav.; 15.651 mi. road between Park River and Grafton, S.A.P. 116-1322 Re, Walsh Co.; grading, structures 3.834 mi. Fairview North, NRS 470B, McKenzie Co., 33,823 cu.yd. unclassified excav.; 6.263 mi. south of Wilton, NRH 429A, Burleigh Co., 74,384 cu.yd. unclassified excav.; 9.426 mi. north and south of Halliday, NRH 3450 and NRM 345D, Dunn Co., 141,269 cu.yd. unclassified excav.; 7.073 mi. south of Marmarth, NRS 456, Bowman Co., 91,794 cu.yd. earth and 2,950 cu.yd. rock excav.; 11.131 mi. Killdeer Northwest, NRH 397C and NRM 397D, Dunn Co., 158,696 cu.yd. unclassified excav.; grading, graveling 5.203 mi. south of Minot, NRH 85, Ward Co., 106,416 cu.yd. earth and 918 cu.yd. rock excav.; 0.097 mi. in Hillsboro, NRM 5, 5E, 61D, Traill Co., 3,802 cu.yd. earth excav.; 10.524 mi. in Kongsburg North, NRS 496, McHenry Co.; 4.255 mi. south of Butzville, NRS 484, Ransom Co.; 6.712 mi. west of Strasburg, NRS 466, Emmons Co.; 3.043 mi. north of Elliott, NRS 527, Ransom Co.; 9.058 mi. in Kintyre and Braddock south, NRS 464 and 465, Emmons Co.; 2.91 mi. in Selz West, NRS 480; 5.741 mi. Orrin East, NRS 479; 4.041 mi. NRS 517, all foregoing Pierce Co.; 7.124 mi. in Clifford, NRS 493, Traill Co.; 9.958 mi. north of Plaza, NRS 475; 10.204 mi. NRS 476, south of Ross, both Mountrail Co.; 3.385 mi. Lincoln Valley East Rd., NRS 486, Sheridan Co.; 6.771 mi. north and east of Simcoe, NRS 503, McHenry Co.; 6.39 mi. NRS 492, Stutsman Co.; 8.337 mi. west of south of Upham, NRS 505, McHenry Co.; 11.929 mi. road from Ryder to Douglas, NRH and M 385B, Ward Co.; 10.2 mi. north of Elgin, NRH 402A, Grant Co.; 22.399 mi. northeast of Adain, NRH 354CD, Barnes, Stutman and LaMoure Counties; 1.536 mi. south of Elbowoods, F.A.P. 345A, McLean and Mercer Counties; 16.236 mi. Amidon south and west, NRH 443A, NRH 443B and NRM 443C, Slope Co.; 11.551 mi. north of Wyndmere, NRH 431B, Richland Co.; 13.329 mi. Dunseith north and spur to Haven, NRH and M 421, and NRS 508, Rolette Co.; 16.226 mi. north of Haynes, NRH 427B and NRH 427C, Adams Co.; 9.966 mi. from southwest cor. 19-131-66 thence east, NRS 462, Dickey Co.; 6.36 mi. Backoo and Hensel Rd. East, NRS 477 and 478, Pembina Co.; landscaping 0.157 mi. in Stanley, NRM 118ABC, Mountrail Co. $696.145. T. G. Plomasen, hy. comr.

Pennsylvania—Nov. 23, at office S. S. Lewis, secy. Hys., Harrisburg, bituminous surface course, Spec. E on concrete base and broken stone sub-base paving, curbing, drainage 1,257 ft. R-257, Sect. 3, Pittsburgh, Allegheny Co., involving 5,718 cu.yd. Class 1, 1,200 cu.yd. Class 2 and 980 cu.yd. foreign borrow excav.; rein.-con. paving 29,445 sq.yd. R-157, Sect. 7-A, Kutztown Borough, Maxatawny Twp., Berks Co., 11,287 cu.yd. Class 1 and 73 cu.yd. Class 2 excav.; bituminous surface course Spec. E on broken stone paving, incl. rein.-con. arch bridge on 656 ft. R-326, Solebury Twp., Bucks Co., 1,375 cu.yd. Class 1, 829 cu.yd. Class 2 and 1,490 cu.yd. borrow excav.; bituminous surface course on plain concrete paving, Spec. E, vitr. brick guttering 1,291 ft. R-225, Chester, Delaware Co.; dual type paving 5,925 ft. R-8, Sect. 2, Milford Borough Milford Twp., Pike Co., 9,597 cu.yd. Class 1, 907 [illegible] cu.yd. Class 2 and 5,200 cu.yd. borrow excav.

Tennessee—Nov. 23, by Dpt. Hys. & P. Wks., Nashville, grading, drainage 0.976 mi. State Hy. 3, NRH R-8-E, Shelby Co.; 7.978 mi. Hy. 112, NRH 239-C, Cheatem Co.; 0.734 mi. State Hy. 56, NRS 275-D, Grundy Co.; grading, drainage, paving 0.255 mi. Hy. 1, NRM [illegible] Shelby Co.; 0.313 mi. State Hy. 54, NRM [illegible] G, Parts 1 and 2, Weakley Co.; paving 3.702 mi. State Hy. 18, NRH 268-D, Hardeman Co., 5.236 mi. State Hy. 2, NRH 269-C, [illegible] Co.; 2.187 mi. State Hy. 33, NRH 243-C, [illegible] roe Co.; grading, paving 0.298 mi. State [illegible] NRM 208-F, Rutherford Co.; grading for [illegible] side development 13.091 mi. State Hy. [illegible] NRH 248-C and E, reopened, Knox, [illegible] and Sevier Counties.

Tex., Eagle Lake—City bids about [illegible] curbing, asphalt on 8 in. gravel paving 3.8 mi. residential streets. $50,000. P.W.A. project. N. B. Davidson, Eagle Lake, engr.

Tex., Victoria—City, B. T. Jordan, mayor, bids about Nov. 31. 8 in. rein.-con. paving 60,000 sq.yd. streets in business section, reinforcing 150,000 lb. reinforced steel, 10,000 cu.yd. excav. $70,000. E. F. Miles, city engr.

West Virginia—Nov. 20, by State Road Comm., Charleston, retread surfacing 13.85 mi. Project 830E 3104-B, 3205 and 3091, Seth Whitesville Rd., Boone Co.; bituminous concrete paving 1.86 mi. Glendale Narrows Rd., Projects 80 and 234, Marshall Co.; 1.55 mi. Pogues Run-Ozley Park Rd., Project 832, Ohio Co.; grading, draining 4.46 mi. Shaw-Elk Garden Rd., Project 833-B, Mineral Co.; 2.45 mi. Route 15-Bergoo Rd., Project 829-B, Webster Co.; graveling 5.3 mi. Joseph Mills-Doddridge County Line Rd., Project 828, Tyler Co.

Wisconsin—Nov. 27, by State Hy. Comm., Madison, grading, draining 2.158 mi. Nelsonville-Alma Rd., Alma, NRM 468-R 390-B, Buffalo Co., incl. 77,600 cu.yd. earth, borrow, special ditches, channel, 57,835 cu.yd. solid rock, 7.41 mi. Whitehall-Ettrick Rd., U. S. Hy. 53, NRM 120-B, Trempealeau Co.

CONTRACTS AWARDED

Arizona—State Hy. Comn., Phoenix, grading, draining 9.8 mi. Ash Fork-Kingman Hy., to N. G. Hill & Co., 1145 West Culver St., Phoenix, $79,270; 9 mi. Kingman-Boulder Dam Hy., to R. C. Tanner and W. E. Hall Co., 525 Title & Trust Bldg., Phoenix, $54,355. **P.W.A.** Bids Oct. 30. Noted Oct. 18.

Arizona—State Hy. Comn., Phoenix, grading, draining, oil processing 4.2 mi. Prescott-Jerome Hy., to Lee Moor Constr. Co., 807 Bassett Tower, El Paso, Tex., $36,766***grading, draining, select material and road oil road mix with an emulsified asphalt seal coat on streets in Benson, to Borderland Constr. Co., P. O. Box 905, Tucson, $18,544***widening 2 concrete bridges and constructing 2 new concrete bridges on Geronimo-Solomonville Hy., to Wm. Pepper Constr. Co., P. O. Box 1564, Phoenix, $7,983. Grand total $63,293. **P.W.A.** Bids Oct. 18. Noted Oct. 11.

California—C. H. Purcell, engr. State Hy. Dpt., 808 State Bldg., Los Angeles, grading, asphaltic concrete paving 0.6 mi. hy. between Pacific and Olive Aves., Long Beach, Los Angeles Co., to Griffith Co., Los Angeles, Railway Bldg., Los Angeles, $38,523***grading, concrete paving 3.4 mi. hy. between point 0.4 mi. east of Peralta School and Gypsum Creek, Orange Co., to Sharp & Fellows Contg. Co., Central Bldg., Los Angeles, $165,488.

Calif., Alameda—City Council, widening Webster St., to Independent Constr. Co., 46th Ave. and Clement St., Oakland, $23,679; improving Maitland Ave., to Heafey-Moore Co., 344 High St., Oakland, $13,395. Bids Oct. 16, awarded Nov. 2. Noted Oct. 4.

Connecticut—State Hy. Comn., Hartford, reinforced con. paving 1,843 ft. and 3 in. bituminous macadam on 5 in. broken stone paving 839 ft. Union and Masonic Sts., and Montauk Ave., New London, to N. Benvenuti & Sons, 6 Elm St., New London, $73,167***11,512 ft. storm drains, etc., 11 sections of streets, Rock and Winchester Aves., Wooding and Morses Sts. vicinity, Hamden, to Clark Sewer Constr. Co., 631 Lindley St., Bridgeport, $37,875***12 ft. span rein.-con. bridge Woodbury, to A. Jarvis, 416 Center St., Manchester, $5,139. Grand total $116,181. **P.W.A.** Bids Oct. 22. Noted Oct. 18.

Connecticut—State Hy. Comn., Hartford, reinforced con. paving 3,918 ft. Southport Cutoff, Fairfield, and 11,483 ft. Oyster River Cutoff, Old Saybrook, to New Haven Road Constr. Co., Inc., 1817 Dixwell Ave., Hamden, New Haven, $47,391 and $66,833 respectively, both Federal Aid Projects***grading, drainage 10,763 ft. Merritt Hy., Greenwich, to J. Arborio, West Cedar St., Poughkeepsie, N. Y., $273,823***bituminous macadam on broken stone paving 26,983 ft. Route 110, Shelton and Monroe, to C. W. Blakeslee & Sons Co., Inc., 58 Waverly St., New Haven, $290,997, both **P.W.A.*****asphaltic concrete paving 5,587 ft. Laurel Rd., Stamford, to P. Bacco, Stamford, $39,616, Trunk Line project. Grand total $718,660. Bids Oct. 8. Noted Oct. 4.

†**Idaho**—Pub. Rds., Ogden, Utah, grading, draining 1.5 mi. road in Boise Co., to Triangle Constr. Co., Spokane, Wash., $57,819. Est. $66,945. Bids Oct. 16.

Illinois—Dpt. P. Wks. and Bldgs., Div. Hys., Springfield, paving 0.65 mi. road in Edgar Co., to Bishop Constr. Co., Danville, $21,108***

†*Federal Government.*

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Streets and Roads (Continued)

7.59 mi., Clinton Co., to Madison Constr. Co., Edwardsville, $184,657***1.29 mi. Madison Co., to Hanes & Kilgo, Alton, $41,379***0.42 mi. Cook Co., to Pronger Constr. Co., Blue Island, $34,728***1.24 mi. Marion Co., to Hartmann Clark Bros. Co., Peoria, $112,826***0.27 mi. McLean Co., to Berenz & Son, Bloomington, $17,816***1.58 mi. Winnebago Co., to Milburn Bros., Inc., Rockford, $45,794***3.79 mi. Jasper Co., to O. Arnold, Casey, $20,709***3.46 mi. Marion Co., to G. R. Barr, Rochester, Ind., $27,204***2.09 mi. Montgomery Co., to C. E. Reid Constr. Co., Springfield, $26,430***2.7 mi. St. Clair Co., to Hoeffken Bros., Belleville, $82,370***3.02 mi. Saline Co., to Barnett & McCoy Constr. Co., Carbondale, $28,657***bridge in Montgomery Co., to J. C. Bremer, Hillsboro, $6,315. Grand total $649,903. **P.W.A.** Bids Oct. 9, 19 and 24 and Nov. 1. Noted Oct. 4, 11 and 25.

Illinois—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, grading 1.28 mi. Pulaski Co., to Marion Constr. Co., Marion, $10,937***2.25 mi. in Gallatin Co. and 5.49 mi McLean Co., to Breeden Constr. Co., Fulton, $7,979 and $28,721 respectively***paving 2.66 mi. Monroe Co., to Edwardsville Constr. Co., Edwardsville, $63,267***paving approaches 0.25 mi. in Ogle Co., to Gund Graham Co., Freeport, $12,308***0.15 mi. in Henderson Co., to H. J. Eppel, Pontiac, $11,975***4.58 mi. McDonough Co., to W. F. Mannaugh, Winchester, $18,176***7.16 mi. Sangamon Co., to Keating Bros., Springfield, $23,627. Grand total $176,990. **P.W.A.** Bids Oct. 19. Noted Oct. 11.

Ill., Chicago—Dpt. P. Wks. & Buildings, Div. Hys., concrete paving 0.2206 mi. Sect. 125-0101-15D and 1.2977 mi. Sect. 051-3536-15D, to I. D. Lain Co., Morton Grove, $15,095 and $57,047 respectively. Bids Oct. 3.

Ill., East Alton—Bd. Trustees, widening Alton St. Louis Rd. and Alton-Edwardsville Rd., to Hanes & Kilgo, Alton, $67,298. Est. $70,087. **P.W.A.** Bids Oct. 24, awarded Oct. 31. Noted Oct. 18.

Ill., Evanston—Dpt. P. Wks. & Buildings, Div. Hys., bituminous resurfacing 1.0841 mi. Sect. 1-CS, to J. McGarry & Co., 189 West Madison St., Chicago, Ill., $22,923. Bids Oct. 10.

Ill., Peoria—Dpt. P. Wks. & Buildings, Div. Hys., concrete paving 1.4487 mi. in city, to Hartmann Clark Bros., Peoria, $163,494. Bids Oct. 9.

Ill., Watseka—Dpt. P. Wks. & Bldgs., Div. Hys., concrete paving 1.0047 mi. Sect. 105-15D, to A. J. Shanks Constr. Co., Watseka, $13,970***44.25 tons coarse aggregate, to Newton County Stone Co., Kentland, Ind., $1.65 per ton; 30 tons sand, to Moulding-Brownell Corp., 65 West Wacker Dr., Chicago, $1.35 per ton; 61 bbl. portland cement, to Woodland Farmers Co-operative Elevator Co., Woodland, $2.64 per bbl.***480 sq.ft. welded wire fabric and 2,130 lb. reinforcing bars, to R. B. Leonard Co., Peoria, $69.83. Bids Oct. 8.

Nevada—State Hy. Comn., Carson City, oil processing roadway by road mix method 17 mi. in Nye Co., to Silver State Constr. Co., Fallon, $29,100***grading, draining, surfacing roadbed with asphaltic road material 4.73 mi. Douglas Co., to Fredrickson Watson Co., Fredrickson Bros. and Jones & King, Oakland, Calif., $84,100***grading, crushed graveling roadbed 23.19 mi. Esmeralda Co., to Dodge Constr. Co., Fallon, $129,000. Grand total $242,200. **P.W.A.** Bids Oct. 30.

New York — A. W. Brandt, comr. Hys., Albany, graveling 4.92 mi. in Chenango Co., to Corbisello Bros., Inc., Marathon, $37,463 est. $45,730***5.43 mi. St. Lawrence Co., to L. Meyersohn, Plaza St., Albany, $230,984 est. $276,855***4.77 mi. Schoharie and Otsego Counties to Rochester Vulcanite Paving Co., Rochester, $242,983, est. $287,514***2.44 mi. Cayuga Co., to Arzani & Gessler, Syracuse, $8,617 est. $10,914. Grand total $520,047. **P.W.A.** Bids Oct. 23. Noted Oct. 11.

N. Y., Brooklyn — R. V. Ingersoll, pres. Brooklyn Boro. Boro Hall, to B. Turecamo Contg. Co., New Cropsey Lane, asphalt paving Bainbridge St, $9,604; Buffalo Ave, $7,058; East 24th St, $6,593; East 33rd St., $4,694; East 46th St, 4,856; East 49th St, $3,410; East 53rd St, $5,926; East 56th St, $4,506; Highlawn Ave, $2,762; Avenue R $3,583***to Den Spa Corp., 222-07 Jamaica Ave., Queens Village, granite paving Division St, 6,780***to T. Vitanza, 710 Avenue W, grading East 23rd St, $2,181; East 46th St, $2,223; East 53rd St, $1,123; East 56th St, $2,618***to Highway Impvt. & Repair Corp., Furmans Island, asphalt paving Division Ave, $44,351. Grand total $72,268. Bids Oct. 3. Noted Sept. 27.

N. Y., Brooklyn — R. V. Ingersoll, pres. Brooklyn Boro, Boro Hall, to Mill Basin Asphalt Co., 4616 Glenwood Rd., asphalt paving East 18th St, $7,178; East 32nd St, $4,914; 46th St, $8,156***to B. Turecamo Contg. Co., New Cropsey Lane, asphalt block paving Troy Ave, $30,102***to Ronnoc Contg. Co., 629 Albany Ave., regulating 64th St, $1,640. Grand total $51,990. Bids Oct. 25. Noted Oct. 18.

N. Y., Brooklyn — R. V. Ingersoll, pres. Brooklyn Boro, Boro Hall, to T. Vitanza, 710 Avenue W, grading Brighton 2nd St, $1,952; East 12th St, $1,089; East 45th St, $996; East 51st St, $1,407; West 71st St, $1,606*** to Mill Basin Asphalt Co., 4616 Glenwood Rd., Christopher Ave, $2,059; Crystal St, $4,090; Flatlands Ave, $13,490; Newport St, $2,119; Horace Court $1,849; Williams St, $2,867; 70th St, $2,106; Hawthorne St, $13,441; Pitkin Ave, $69,772***to Den Spa Corp., 222-07 Jamaica Ave., Queens Village, grading Christopher St., $938*** to J. and M. Moran Ex. Co., 413 Sterling Pl., Cropsey Ave, $884; grading Newport St, $1,200***to G. A. Alfieri, Flatlands Ave, $5,932***to P. Kelly Contg. Co., 6009 Woodside Ave., Woodside, granite paving Gold St, $3,391***to B. Turecamo Contg. Co., New Cropsey Lane, Monroe St, $10,035 Stuyvesant Ave, $19,420***to A and L Service Stations, 1705 Pitkin Ave., Emmons Ave, $23,200. Grand total $183,843. Bids Sept. 26. Noted Sept. 27.

N. Y., Salamanca—Dpt. P. Wks., City Hall, widening, resurfacing with black top on concrete Broad, Main, Center, Front, East and West State Sts., day labor, $25,000 or more. C. C. Cheney, supt.

North Carolina—State Hy. Dpt. & P. Wks., Raleigh, crushed stone surfacing 7.23 mi. Project 7952, Yadkin Co., to E. W. Grannis, Fayetteville, $43,204. Bids Oct. 18, awarded Nov. 7.

Ohio—O. W. Merrell, dir. Hys., Columbus, brick, paving, incl. furnishing, delivering brick and constructing concrete slab bridge over branch of Hocking River on 0.644 mi. Columbus-Lancaster Rd., Fairfield Co., to W. H. Ringwald & Sons Co., 42 East 2nd St., Chillicothe, $36,200.

Ohio—O. W. Merrell, dir. Hys., Columbus, brick paving, incl. furnishing, delivering brick and landscaping 0.269 mi. Mansfield-Wooster Rd., Ashland Co., to George B. Herring & Son, 216 Bird Bldg., Mansfield, $28,721*** grading, draining, brick widening incl. furnishing, delivering brick 0.118 mi. Sect. "Middletown" (part) Hamilton-Middletown Rd., Butler Co., to Bigler Paving Co., 206 Aberdeen Dr., Middletown, $7,659***grading, constructing storm sewer and brick on concrete base repaving 0.919 mi. Sect. "Youngstown" (part of South Ave.) Youngstown-East Liverpool Rd., Mahoning Co., to C. W. & P. Constr. Co., and Johnson & Johnson, 634 East Buchtel Ave., Akron, $92,264. Grand total $128,644. Bids Oct. 26.

Ohio—O. W. Merrell, dir. Hys., Columbus, grading, draining, landscaping and brick paving, incl. furnishing, delivering brick, 0.908 mi. Sect. "K-2" (part) National Rd., Belmont Co., to Price Constr. Co., 2702 3rd Ave., Huntington, W. Va., $88,318***grading, widening, hot mixed asphaltic concrete paving 2.214 mi. Sect. "R" (part) Hillsboro-Washington C. H. Rd., Highland Co., to Andrews Asphalt Paving Co., 808 1st Natl. Bank Bldg., Hamilton, $54,446*** grading, draining, traffic bound surface course paving 0.482 mi. Sect. "S" (part) Caldwell-McConnelsville Rd., and constructing three 6 ft. concrete beam bridge over Dyes Fork & Meigs Crook, Morgan Co., to Kear & Baker, Wharton, $40,021***constructing, drainage structures, grading 3.774 mi. Sects. "A" and "G" Van Wert-Paulding Rd., Paulding Co., to Davis & Hydaker Co., Spencerville, $64,600. Bids Nov. 2. Grand total $247,385. Noted Oct. 25.

O., Cleveland—Cleveland Metropolitan Park Bd., 1328 Standard Bldg., driveway in South Chagrin Reservation, involving 8,000 cu.yd. gravel in place, 275 cu.yd. 1-2-4 concrete, 49,300 cu.yd. earth excav., 19,200 lb. reinforcing steel, to Burke & Co., 60 Buckingham Rd., $45,886. Awarded Nov. 7. **P.W.A.**

Oregon—State Hy. Comn., Portland, grading, pipe and culverts 6.62 mi. Deschutes Co. and 4 mi. Jackson Co., to Burke Bros., Portland, $59,282 and $93,900 respectively***2.31 mi. Benton Co., to D. L. Ashton, Lebanon, $23,243 ***0.7 mi. Jackson Co., to E. F. Webber, Portland, $95,445***5.86 mi. Malheur Co., to O. N. Pierce, Portland, $35,342***6.2 mi. Morrison Co., to Fisher Bros., Oregon City, $32,866*** 5.96 mi. Wallowa Co., to Colonial Constr. Co., 326 1st St., Spokane, Wash., $62,510***furnishing 6,000 cu.yd. crushed rock in stockpiles on road in Douglas Co., to A. S. Wallace, Roseberg, $9,000***bridge in Baker Co., to Averill & Philpot, Portland, $11,186. Grand total $422,864. (Balance of projects not yet awarded, listed under classification Low Bidders).

Pennsylvania—At office S. S. Lewis, secy. Hys., Columbus, rein.-con. paving 2.96 mi. Route 50, Sect. 2, Wharton Twp., Fayette Co., to Donora Constr. Co., Donora, $196,031. Bids Aug. 20***bituminous surface course on plain concrete paving, vitr. brick guttering 0.62 mi. Route 180, Sect. 2, Chester, Delaware Co., to Pennsylvania Paving Co., Front and Franklin Sts., Chester, $66,687***rein.-con. paving, bituminous approaches 1.15 mi. Route 49, Sect. 2, Allegheny, Stoney Creek and Brothers Valley Twp., Somerset Co., to Corrado & Galiardo Constr. Co., 810-811 Second Natl. Bank Bldg., Connellsville, $56,585***rein.-con. paving and rein.-con. wearing surface for bridge floor, 1.3 mi., Route 1, Lower Mahoney Twp., Northumberland Co., to Graham Constr. Co., Woolworth Bldg., Lancaster, $55,228, all foregoing Bids Oct. 26. **P.W.A.** Grand total $374,531. Noted Oct. 18.

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, Spec. "E" on plain concrete paving, vitr. brick gutters, bituminous surface Spec "E" on plain concrete paving and bituminous surface Spec. "A" on existing base, curbing, guttering 0.43 mi. Lancaster Ave.,

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†Federal Government.

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Streets and Roads (Continued)

Philadelphia, Phila. Co., to Dalton Bros., Paoli, $64,343•••Spec. B. Types 1, 2 or 2 on native stone or modified stone paving 2.54 mi. Route 55013, Sect. 1-A, East and West Brunswick Twps., Schuylkill Co., to C. F. Goeringer Constr. Co., 296 Madison St., Wilkes-Barre, $74,525. **P.W.A.** Bids Oct. 11. Noted Oct. 4.

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, rein.-con. paving 2.31 mi. Route 35001, Sect. I, Covington and Spring Brook Twps., Lackawanna Co., **P.W.A.**, to Tyler & Cole, Meshoppen, (Wyoming Co.), $171,923; dual type paving 2 rein.-con. outside lanes, and bit. surface course Spec. "E" on native stone base center lane 3 mi. Route 8, Sect. 1, Milford and Westfall Twps., Pipe Co., to F. D. Kessler, Inc., 138 Queen St., Northumberland, $162,622. State Project. Bids Oct. 5. Noted Sept. 27.

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, bituminous surface course Spec. E surfacing 1.03 mi. Routes 190 and 342, Hanover Borough, York Co., to Hutchinson Contg. Co., 138 and 40 Springfield Rd., Clifton Heights, $31,322; rein.-con. paving 0.52 mi. Route 646, Sect. 2, Hatfield Borough, Montgomery Co., to Dalton Bros., Inc., Paoli, $42,620. **P.W.A.** Bids Oct. 19. Noted Oct. 11.

Tennessee—State Hy. Dpt. Hys. & P. Wks., Nashville, paving 4.09 mi. NRH R-8A (1935) Parts I and II, Shelby Co. and 4.084 mi. State Hy. 3, NRH 271-D and NRM 271-C, Shelby Co., to Carey-Reed Paving Co., 575 North Front St., Memphis, $70,119 and $82,594 respectively •••grading, drainage, paving 1.178 mi. State Hy. 6, NRH 206, Parts II and III, Davidson Co., to T. M. Strider & Co., Cotton States Bldg., Nashville, $65,763•••grading, drainage 4.763 mi. State Hy. 69, NRS 290-B, Benton Co., to J. Oman, Jr., Acklen Park, Nashville, $57,285. Bids Nov. 2. Grand total $275,761. **P.W.A.** Noted Oct. 25.

Utah—State Road Comn., Salt Lake City, graveling 3.88 mi. in Wayne and Piute Counties, to J. W. Whiting, Springville, $8,801 est. $11,789; 0.78 mi. Kane Co., to T. G. Rowland, 1558 Yale Ave., Salt Lake City, $19,371 est. $23,566. Bids Nov. 2, awarded Nov. 2.

†Utah—Pub. Rds., Ogden, grading, draining, surfacing roadbed 5.009 mi. road in Kane Co., to W. W. Clyde & Co., Springville, $63,078. Est. $62,506. Bids Oct. 16.

Vermont — State Hy. Dpt., Montpelier, H. E. Sargent, ch. engr., grading, drainage, base 2.4 mi. Route 105, NRH 90C, Derby, to B. A. Gardetto, Inc., 58 West Central St., Natick, Mass., $18,016, bids Sept. 28•••gravel mixed in place 1.6 mi. Route 116, NRS 140 B, Shelburne, St. George and Hinesburg, and grading, base, drainage 1.8 mi. Route U. S. 2, NRH 118-C, St. Johnsbury, to Cenedella & Co., 167 Main St., Milford, Mass., $26,597 and $36,661 respectively•••gravel mixed in place 1.7 mi. Route 104, NRH 138-C, Fairfax, to E. H. Lewis, Andover, Mass., $22,492••• 1.2 mi. Route 107, NRH 101-H, Stockbridge, and grading, base, drainage 2.4 mi. Hyde Park-Johnson Rd., NRH 133-B and State 113-N, Johnson, to R. A. Phelps, Montpelier, $22,874 and $33,119 respectively•••Dead Creek Bridge, Addison, to B. A. Barton Constr. Co., Ticonderoga, N. Y., $11,598, all foregoing bids Oct. 19, awarded Oct. 31. Grand total $171,357. **P.W.A.**

Vermont—State Hy. Dpt., H. E. Sargent, ch. engr., Montpelier, bituminous macadam surfacing 1.9 mi. Project NRH 105-G, Route U. S. 9, Woodford, 24 ft., to J. J. Belotte & Son Constr. Co., Troy, N. Y., $50,236. **P.W.A.** Bids Oct. 26, awarded Nov. 7.

Ontario—C. H. Fullerton, deputy minister Dpt. Northern Development, Parliament Bldgs., Toronto, clearing, grading 2 mi. road from Geraldton to Little Long Lac Gold Mines, to Rayner Constr. Co., 29 Commercial St., Toronto, $22,000. Noted Sept. 13.

Ontario—Dpt. Northern Development, R. A. Campbell, minister Toronto, clearing, grading section of Kenora-Fort Francis Hy. from 30 mi. south of Kenora for 31 mi., to Dufferin Paving & Crushed Stone Ltd., Fleet St. W., Toronto. Est. approximately $100,000. Noted Oct. 4.

Ont., Kaladar—Northern Development, Parliament Bldgs., Toronto, grading and culverts on 8 mi. Contr. 34-77, Kaladar S., to Campbell Constr. Co. Ltd., 67 Yonge St., Toronto, $150,000.

Ont., Waverley—Northern Development, Parliament Bldgs., Toronto, concrete paving 8 mi. Contr. 34-78 Waverley South, to Sterling Constr. Co., Windsor. Est. $100,000.

Ont., Welland—See "Sewerage and Waste Disposal."

Que., Montreal—City Executives, sidewalks on Park Ave., to Duranceau & Duranceau, Ltd., 5487 Hamilton St. $63,610.

EARTHWORK, IRRIGATION DRAINAGE AND WATERWAYS

PROPOSED WORK

Calif., Hamilton—H. R. Allard, secy. Glenn-Colusa Irrigation Dist., Willows, rejected bids Oct. 18, furnishing, installing steel bar fish screen on wooden piles and steel frame in the intake in front of pumping plant near Hamilton City and fish screen cleaner (moveable).

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Calif., Los Angeles—Bd. Supervs. Flood Control Dist., 205 South Bway., did not open bids Nov. 5, for placing 159,500 cu.yd. loose rock fill, downstream face, 3,000 cu.yd. packed rock fill on crest and 62,000 cu.yd. waste in waste piles on Dam 2, as Bd. Supervs. did not meet. Will be opened Nov. 7.

†Ill., Alton—U. S. Eng., 428 Custom House, St. Louis, Mo., bids late in January or early in February, rein.-con. dam across Mississippi River, incl. necessary bank protection work, on Missouri side of river, being part of Lock and Dam Project 26. $5,000,000. Noted Nov. 23, 1933.

Md., Annapolis—Comrs. Anne Arundel Co., Court House, making plans creosoted timber and masonry wall, Tydings on Bay. J. A. Bromley, Court House, Annapolis, engr.

N. Y., New York—See "Industrial Buildings."

N. Y., Salamanca — City defeated $12,000 bonds, for dredging channel in Allegheny River. Est. $17,500. Noted Sept. 27.

†North Carolina—U. S. Eng., Wash., D. C., plans completing dredging of Beaufort Inlet. $20,000.

Pa., Sunbury—Borough plans new dam in Susquehanna River to replace structure washed out by ice and floods. $130,000. About $17,000 will be expended for materials. Will be financed by either P.W.A. or F.E.R.A.

†Tex., Galveston—U. S. Eng., Trust Bldg., plans repairing jetties, remodeling and repairing north jetty at entrance to Galveston Harbor. $102,000.

Tex., Houston—See "Public Buildings."

†Utah—Bureau Reclamation, Denver, Colo., rejected bids Oct. 18, constructing 7,200 ft. 5x7 ft. tunnel through Wasatch Range to bring water from Colorado River Water Shed into Sanpete Co., for Ephraim Irrigation Co.

B. C., Pentieton—Municipality plans additional water storage for irrigation purposes, estimates to be made on 3 schemes (1) new dam 30 to 40 ft. high, 700 ft. long (2) raising Ellis Creek Dam (3) raising Penticton Creek Dam. Est. about $190,000. T. Finnie, Penticton, engr.

Ont., Toronto—Dpt. P. Wks., Ottawa, soon takes bids constructing 2 new docks in Toronto Harbor at end of ship channel and foot of Cherry St. $760,000.

BIDS ASKED

†Calif., Earp—Nov. 26, by Bureau Reclamation, Dpt. Interior, street, alley, parking area and sidewalk grading and surfacing, water systems, drainage channels, and an electrical distribution system, etc., for Government Camp at Parker Dam, Parker Dam Project, about 16 mi. northeast of here, California-Arizona, incl. 14,500 cu.yd. excav., Spec. 638-D.

†Ill., Joliet—Nov. 21, by U. S. Eng., Post Office Bldg., Canal and Van Buren Sts., 1 story, basement, brick, concrete lock control house, on Brandon Road Lock. Noted Aug. 2.

†Mo., Canton—Dec. 5, by U. S. Eng., Rock Island, Ill., constructing and installing power control and lighting system for Lock and Dam 20, on Mississippi River, near here, incl. control switchboard, remote control stations in lock walls, wiring, lighting, transformer, crane contact rails, lock and dam lighting and navigation signal light system, gasoline-electric standby power unit in central control station, electric tow-haulage units installed complete on land wall at each end of lock chamber, incl. central controlling lighting system, hand operated traveling bridge crane in central control station, recording gaging stations, etc.; adv. E.N.-R. Nov. 15.

†Montana—Nov. 27, by Bureau Reclamation, Dpt. Interior, Fairfield, constructing earthwork, structures, for Mill Coulee Canal, Greenfields Div., Sun River Project, incl. 124,000 cu.yd. excav. for canal and laterals, 5,200 cu.yd. excav. for structures.

Neb., Columbus—Nov. 22, by Loup River Public Power Dist., constructing reservoir, canal earthworks, 1,200,000 cu.yd. earth excav., 850,000 cu.yd. canal embankment, 350,000 cu.yd. rolled reservoir dikes, 150,000 cu.yd. unrolled reservoir levee; 8,500 cu.yd. concrete with 500 tons steel reinforcing. Noted Oct. 18.

†O., Gallipolis—Dec. 5, by U. S. Eng., Huntington, W. Va., constructing roller gate dam at Gallipolis Lock and Dam, on Ohio River 9 mi. below here, incl. 1,149 lin.ft. cofferdam, 117,100 cu.yd. common and 13,400 cu.yd. rock excav., 45,200 sq.ft. rock channeling 14,400 cu.yd. fill, 28,300 sq.ft. steel sheet piling, 11,400 cu.yd. derrick and rip rap stone, 87,400 cu.yd. Class B concrete, etc.; adv. E.N.-R. Nov. 15.

†Oregon—Nov. 26, by Bureau Reclamation, Dpt. Interior, Ontario, constructing Malheur River and Dead Ox siphons North Canal, Owyhee Project, 6 mi. southwest of here, Spec. 598.

†Oregon — Dec. 3, by Bureau Reclamation, Dpt. Interior, Ontario, earthwork and structures, North Canal, Dead Ox Flat Division, Owyhee Project, Oregon and Idaho, incl. 800,000 cu.yd. canal and 25,000 cu.yd. structural excav.

Tex., Brownsville—Brownsville Navigation Dist., c/o H. L. Yates, Brownsville, taking bids extending watermains from city limits to [illegible] basin, a distance of about 4 mi. $124,000. R. J. Cummins, Bankers Mortgage Bldg., [illegible] and Brownsville, engr. P.W.A. project.

CONTRACTS AWARDED

Fla., Atlantic Beach—Town, 5,651.5 [illegible] con. T type seawall with ramps and [illegible] 7th and 15th Sts., to North American [illegible] Co., Jacksonville, $151,853. Bids [illegible] Noted Oct. 4.

Ill., East St. Louis—Bd. Trustees [illegible] Levee Dist., constructing diversion [illegible] Cahokia Creek, in vicinity of Nation[illegible] Yards, to G. Locke Tarlton, 411 North [illegible] St. Louis, Mo., $2,259,993. Est. $2,[illegible] **P.W.A.** Bids Nov. 2. Noted Sept. 27.

Ill., Hillview — Hartwell Drainage & Levee Dist., C. Arnold, secy., 211 East St., [illegible] tion of pumping station in back of Hartwell Drainage & Levee Dist., to S. G. [illegible] F. H. Foote, 405 North Sandy St., [illegible] Bids Oct. 25. Noted Sept. 6.

N. M., Albuquerque—Middle Rio Grande Conservancy Dist., penstock and butterfly valves to Joshua Hendy Iron Wks., 200 Pine St., San Francisco, Calif., $25,550. **P.W.A.** Bids Oct. 12.

Ont., Gananoque — Dpt. P. Wks., Ottawa, dredging, to Canadian Dredging Co., Ltd., Harbour Comm. Bldg., Toronto, $11,135 est. $12,000; wharf, to Mitchell & Wilson, Gananoque, $10,881 est. $9,000.

Ont., Presque 'Ile—Dpt. P. Wks., Ottawa, dredging, to Canadian Dredging Co., Ltd., Ottawa, Ont., $22,260. Est. $25,500.

Que., Point-au-Pic—Secretary Dpt. P. Wks., Ottawa, Ont., repairing and extending wharf to Hill & Sibbald, St. Catharines, Ont., $117,072. Est. $156,000. Noted Oct. 11.

UNCLASSIFIED

PROPOSED WORK

Calif., Sacramento—SWIMMING POOL—See "Public Buildings."

Mich., Spring Lake—ORNAMENTAL LIGHT STANDARDS—Municipality soon takes bids for ornamental iron street lighting standards and equipment for installation of boulevard lighting system in business section. Funds for project provided for in gift to municipality by George P. Savide, pioneer of town. To exceed $17,750.

Mo., Carthage — PARK — City made plans recreation park, incl. driveway, rein.-con. swimming pool, bath house, $70,000. Hare & Hare, 114 West 10th St., Kansas City, engrs. Noted July 26.

New York—ELECTRIC DISTRIBUTION SYSTEM—New York State Electric & Gas Corp., Ithaca, plans extending electric distribution lines from Cannonsville to Trout Lake, in Delaware Co. To exceed $18,000.

N. Y., Alden—MINERAL SPRINGS DEVELOPMENT—Committee, H. W. Adams, chn., making survey of black water springs for mineral springs development. To exceed $17,750.

N. Y., Brooklyn—COAL POCKET—Audley Clark Co., 527 Smith St., plans by Nicholson Co., 405 Lexington Ave., New York, constructing concrete coal pockets, Smith and Centre Sts. $28,000 with equipment.

N. Y., Brooklyn—COAL POCKETS—Flatbush Coal Co., plans coal pockets, concrete, McDonald Ave. and Avenue S. $28,000 with equipment. W. Neill, 405 Lexington Ave., New York, engr. and archt.

N. Y., Brooklyn—PARK BUILDINGS—Dpt. Parks, Arsenal Bldg., Central Park, New York, plans 2 sports and park concession buildings, one 1 story, 18x24 ft., brick at Caton Ave. between Parkside and Coney Island Ave., and other 1 story, 18x25 ft. at Parkside and Coney Island Aves. $28,000. A. Embury, c/o owner, archt.

N. Y., Buffalo—PARKS—See "Waterworks."

N. Y., Shackeltons Point—GREENHOUSES, etc.—C. S. Brown, 725 Water St., Syracuse, plans by D. J. Baum, Riverdale-on-Hudson, 3 greenhouses, office, heating plant, on Oneida Lake Shore, $35,000. W. Wilson, 101 Park Ave., New York, engr.

North Carolina—ELECTRIFICATION EXTENSION—State Bd. Rural Electrification, Raleigh, appointed C. F. Bridgers, engr., Washington, to make survey in Beaufort and Hyde Counties for extending rural electrification in both counties. Dr. C. Poe, Raleigh, chn. of Bd. C. C. Duke, clerk to Board Comrs., Beaufort Co., Washington, and K. Credle, clerk to Hyde County Comrs., at Swan Quarter.

N. C., High Point—RADIO STATION—J. A. Hart & W. M. Nelson, High Point, c/o Chamber of Commerce, High Point, made application to Federal Comn. for permit to erect new radio broadcast station to operate on 1,200 kilocycles and 100 watts, daytime.

Pa., Delaware Water Gap—SPORTS, etc.—International Ladies Garment Workers Union, 3 West 16th St., New York, bids in February for general and separate contracts sports and recreation development. To exceed $30,000. W. B. Lescaze, 211 East 48th St., New York, archt.

Tenn., Memphis—ELECTRIC POWER LINE—City, voted $9,000,000 bonds to purchase existing electric power distributing system or to build competing facilities. Noted Oct. 11.

†Federal Government

Unclassified (Continued)

Tex., Brownsville—DOCKS and WHARVES—See "Public Buildings."

Tex., Dallas—CENTENNIAL—City voted $3,000,000 for Texas Centennial. State Legislature is expected to contribute $5,000,000 for same purpose. Total cost when completed will be $20,000,000. Noted Sept. 27.

Man., Winnipeg—GRAND STAND—Polo Park Track Assn., plans grand stand. To exceed $30,000. **Maturity later.** Architect not appointed.

BIDS ASKED

Ala., Sylacauga—TRACT DEVELOPMENT—See "Contracts Awarded."

La., New Orleans—LIGHTING SYSTEMS—Nov. 22, by State, through State Advisory Bd. and City, by and through Public Belt R.R. Comn., at Council Chamber, City Hall, furnishing all of material and work required to complete in all details, test and put into operation the lighting systems of combined railroad highway bridge over Mississippi River.

†**N. Y., Brooklyn**—FREIGHT ELEVATOR—Nov. 21, by Yards & Docks, Navy Dpt., Wash., D. C., electrical freight elevator, at Naval Medical Supply Depot, Spec. 7839.

N. Y., Wellsville—PIPE LINE—See "Contracts Awarded."

†**Wash., Fort Lewis**—FENCE—Con. Q.M. taking bids constructing fence. (Date not set.)

CONTRACTS AWARDED

Ala., Sylacauga—TRACT DEVELOPMENT—Corporation, c/o Avondale Mills, Sylacauga, tract development on 80 acre site, also 16 or more dwellings, day labor and separate contract. To exceed $28,000.

Calif., Monterey — MAUSOLEUM — Mission Memorial Cemetery, Monterey, 1 story, 400 crypt capacity, marble, rein.-con. and bronze mausoleum, to H. Seidell, 471 Yerba Buena Ave., San Francisco, $115,000. Awarded Oct. 30.

†**Mich., Camp Custer**—ELECTRIC LINES—Vet. Bu., Arlington Bldg., Wash., D. C., reconstructing electric lines, to Central Electric Co., Battle Creek, $10,316.

N. J., Linden—DOCK—Standard Oil Co. of New Jersey, 26 Bway., New York, concrete dock, concrete pile foundation, to Spearin & Preston, 30 Church St., New York, $173,500. Standard Oil Development Co., Elizabeth, engrs.

N. Y., Wellsville—PIPE LINE—Empire Gas & Fuel Co., H. Bradley, pres., 78 North Main St., 8 mi. natural gas pipe line from Greenwood to connect with feed line of Hornell Gas Light Co., day labor and separate contracts. To exceed $17,750.

O., Oakwood—SWIMMING POOL—National Cash Register Co., Dayton, 40x80 ft., concrete swimming pool, Schantz Ave., to P. Hart, 1820 Emerson Ave., Dayton. Est. exceeds $22,000.

Ontario—GAS PIPE LINE—Southern Ontario Gas Co., Chatham, constructing 11¼ mi. 6¼ in. steel gas pipe line, connecting Dover Field with Kent County pipe line, separate contracts awarded.

Ontario—POWER LINE—McKenzie Red Lake Gold Mines, Ltd., Toronto, will build 44,000 volt line, 5¼ mi. north from Howey Mines in Red Lake Dist. Owner builds. Kribs & Ross, 159 Bay St., Toronto, engrs.

Ont., Gananoque—WHARF—See "Earthwork, Irrigation, Drainage and Waterways."

MATERIALS AND EQUIPMENT

PROPOSED WORK

CEMENT—**Los Angeles, Calif.**—A. J. Holm, city purch. agt., City Hall, rejected bids furnishing cement as required from date of contract to Dec. 31, 1934, f.o.b. cars Santa Fe Ry. Spur, McPherson St., Spec. 3355.

SAND GRAVEL, etc.—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., rejected bids Oct. 25, furnishing, delivering, sand, gravel and rock as required and ordered from Oct. 1 to Mar. 31, 1935, Spec. 1497. To exceed $2,000.

†LUMBER, CEMENT, etc.—**Santa Cruz, Calif.**—U. S. Soil Erosion Service, 106 Front St., plans purchasing lumber, cement, sand, rock, reinforcing steel, wire fencing, sheet iron, corrugated culvert pipe, dynamite, for $200,000 soil erosion project.

CEMENT, etc.—**Colorado Springs, Colo.**—City, E. Mosley, mgr., soon takes bids 27,000 sacks cement and 234 tons reinforcing steel for Crystal Creek Dam. $36,652.

TANKS—**St. Louis, Mo.**—Acme Backing Co., 1514 Hadley St., applied for permit to install two 550 gal. steel underground tanks for storage of naptha, 1541-43 Hadley St.

TANK—**St. Louis, Mo.**—L. Brown & R. Dudley, 4034 Gravois Ave. applied for permit to install one 560 gal. and one 1,000 gal. underground steel tank for gasoline in automobile service station, 4034 Gravois Ave.

TANKS—**St. Louis, Mo.**—Mac's Service Station, 3301 Chouteau Ave., applied for permit to install two 560 gal. underground steel tanks for gasoline, 3301 Chouteau Ave.

†*Federal Government.*

TANKS—**St. Louis, Mo.**—B. Moore & Co., 1630 South 2nd St., applied for permit to install one 10,000 gal. underground steel tank for naptha at 1630 2nd St.

STEEL TANKS—**St. Louis, Mo.**—Southwestern Greyhound Lines, 500 Delmar Blvd., granted permit to install two 10,000 gal. underground steel tanks for storage of gasoline in City Block 627.

TANK—**St. Louis, Mo.**—Square Deal Oil Co., 5339 Easton Ave., applied for permit to install three 1,000 gal. underground tanks for gasoline for automobile service station at 918 North 20th St.

TANK—**St. Louis, Mo.**—Texas Co., 2414 DeKalb St., applied for permit to installing one 1,000 gal. underground gasoline storage tank in automobile service station, 3920 Coronado Dr.

TANKS—**St. Louis, Mo.**—Texas Co., 2414 DeKalb Ave., applied for permit to install 2 additional 1,000 gal. underground steel tanks for gasoline, one at 4036 South Grand Blvd., and other at 460 South Kingshighway and at 2800 Russell Blvd.

TANKS—**St. Louis, Mo.**—A. W. Wenger, 1400 North Vandeventer St., applied for permit to install two 1,000 gal. underground steel tanks for gasoline for an automobile filling station, 1400 North Vandeventer Ave.

HIGHWAY MATERIALS—**Buffalo, N. Y.**—See "Waterworks."

TANKS—**Buffalo, N. Y.**—Bulk Gas Station, 1854 Elmwood Ave., plans installing two 500 gal. storage tanks. To exceed $1,000.

TANKS—**Buffalo, N. Y.**—Gulf Refining Co., 7th and Grant Sts., filed petition for permit to install three 500-1,000 gal. steel tanks at Ohio St. and Buffalo River. To exceed $1,000.

BIDS ASKED

CEMENT—**Los Angeles, Calif.**—Nov. 27, by Metropolitan Water Dist., 306 West 3rd St., F. E. Weymouth, engr. and genl. mgr., 1,120,000 to 5,000,000 bbl. portland cement according to Spec. 79, for Colorado River Aqueduct. $2,000,000 to $7,000,000. Noted Nov. 1.

†GASOLINE ENGINE—**Rock Island, Ill.**—Nov. 27, by U. S. Eng., gasoline engine operated traveling tainter gate hoist, mounted over car approximately 40 ft. 3 in. long between bumpers by 10 ft. 4 in. wide installed on service bridge of Dam 20, Mississippi River; adv. E.N.-R. Nov. 15.

SEWER PIPE—**Salisbury, Md.**—Nov. 22, by F. Dryden, engr., Salisbury, terra cotta sewer pipe, for City.

†TANKS—**Hingham, Mass.**—See "Contracts Awarded."

CEDAR POLES—**Detroit, Mich.**—Nov. 22, by J. J. Gorman, comr. Purchases & Supplies, furnishing f.o.b. Detroit, 1 carload 66 cedar poles, 45 ft. long.

SEWER PIPE—**New York Mills, Minn.**—Nov. 24, by Village, E. Johnson, clk., 3,700 lin. ft. 8 in. No. 2 sewer pipe; 1,100 lin.ft. 10 in. and 2,500 lin.ft. 12 in. pipe, 26 c.i. manhole covers and rings, 40,000 or more hard clay brick.

PIPE—**St. Paul, Minn.**—Nov. 26, by Minneapolis-St. Paul Sanitary Dist., 1923 University Ave., 5,300 lin.ft. 18 in. vitr. or concrete pipe, C. C. Wilbur, ch. engr.

†ACETYLENE GAS—**St. George, N. Y.**—Nov. 26, by Superintendent Lighthouses, St. George, 360,000 cu.ft. acetylene gas, to be furnished as ordered between Jan. 1 and June 30.

†LIGHTED BUOYS—**St. George, N. Y.**—Nov. 19, by Superintendent Lighthouses, three 9x38 W type; one 9x32 G type, four 8x20 B type, four 7x18 B type; three 7x18 type and four 5x15 lighted buoys.

†SINKERS and BALLS—**St. George, N. Y.**—Nov. 22, by Superintendent Lighthouses, 190 c.i. sinkers and ballast balls, total weight 579,490 lbs.

†CONDENSER, etc.—**Phila., Pa.**—Nov. 21, by Yards & Docks, Navy Dpt., Wash., D. C., surface condenser, air ejector, condensate pump for 6,000 kw. alternator, Spec. 7825.

GATE VALVES—**Providence, R. I.**—Nov. 19, by City, City Clerk, City Hall, miscellaneous gate valves to Water Dpt. To exceed $1,000. F. S. Nolan, comr. P. Wks.

CONTRACTS AWARDED

CABLE—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., 8,300 ft. No. 12 AWG 12, conductor, lead-sheathed, rubber-insulated control cable, Spec. 1534, to Bishop Wire & Cable Co., 2412 Ocean View Blvd., $2,133. Bids Nov. 1, awarded Nov. 7. Noted Oct. 25.

CONCRETE SAND—**Los Angeles, Calif.**—A. J. Holm, city purch. agt., City Hall, 900 tons washed concrete sand per month from date of contract, to Dec. 31, 1934, f.o.b. city trucks, dealer's plant or bunker, Spec. 3349, to Consolidated Rock Products Co., 2730 South Alameda St., $1,600. Bids Oct. 19, awarded Nov. 7.

CRUSHED ROCK—**Los Angeles, Calif.**—City, A. J. Holm, purch. agt., City Hall, 600 tons Nos. 2, 3 and 4 crushed rock per month from date of contract to Dec. 31, 1934, f.o.b. City trucks at dealer's plant or bunker, Spec. 3348, to Consolidated Rock Products Co., 2730 South Alameda St., $2,000. Bids Oct. 19, awarded Nov. 7.

FIRE HYDRANTS—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt., 207 South Bway., furnishing, delivering standard pressure fire hydrants, complete, one hundred 24 in. single outlet, and 80 4x4 in. double outlet, Spec. 1538, to Rich Mfg. Co., 3851 Santa Fe Ave., $7,707. Bids Nov. 2, awarded Nov. 7.

LUMBER—**Los Angeles, Calif.**—Dpt. Water & Power, D. P. Nicklin, purch. agt., 207 South Bway., furnishing, delivering 144,000 bd.ft. No. 2 R.D.F. lumber (No. 1 mining) 6 in. x 6 in. x 4 ft. or to any multiple of 4 ft. up to and incl. 20 ft., Spec. 1544, f.o.b. Lone Pine, to Globe Lumber Co., 3557 South Hill St., $3,672. Bids Oct. 29, awarded Nov. 7.

OSCILLOGRAPHS—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering f.o.b. cars or trucks 1 oscillograph per paragraph 4 of specifications, 1 per paragraph 5 and one per paragraph 6 of specifications, high speed, automatic to be installed in major receiving stations for purpose of power system fault study, Spec. 1506, to Westinghouse Electric & Mfg. Co., 420 South San Pedro St., $3,066. Bids Oct. 18, awarded Nov. 1. Noted Oct. 11.

PORTLAND CEMENT—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering in such quantities as required from Oct. 10, for 6 month period portland cement carload deliveries f.o.b. 29 designated points and bidders mill, 750 bbl., to Monolith Portland Cement Co., 215 West 7th St., $2,000; to 13 designated points and bidders mill, 1,000 bbl., to Southwestern Portland Cement Co., 727 West 7th St., $2,140, both Spec. 1517. Bids Oct. 3, awarded Oct. 25.

COARSE AGGREGATE, etc.—**Calumet City, Ill.**—Dpt. P. Wks. & Buildings, Div. Hys., to Seneca Petroleum Co., 439 West 33rd St., Chicago, Ill., 19,600 gal. asphalt cement $2,254; 10,700 gal. $1,231***to State Line Coal & Material Co., Calumet, 300 cu.yd. stone chips $780; 900 cu.yd. crushed stone $2,340; 300 cu.yd. stone chips $780; 100 cu.yd. torpedo sand at $245. Grand total $6,840. Bids Oct. 25.

CABLE—**Chicago, Ill.**—Dpt. P. Wks., City Hall, 16,000 ft. 30 pr. rubber insulated No. 19 A.W.G. cable, to General Cable Corp., 20 North Wacker Dr., $2,768; 10,560 lin.ft. 5 pr. and 15,840 lin.ft. 15 pr. No. 19 A.W. rubber insulated cable, to American Electrical Wks., 20 North Wacker Dr., $2,559. Bids Oct. 18, awarded Nov. 3.

CONDUIT—**Chicago, Ill.**—Dpt. P. Wks., City Hall, furnishing, delivering steel conduit, to Effenger Electric Supply Co., 12 North Jefferson St., $5,319. Bids Oct. 2, awarded Nov. 3.

LEAD COVERED CABLE—**Chicago, Ill.**—City Dpt. P. Wks., 2,800 ft. each 4 and 8 conductor 5,000 volt No. 8 A.W.G. rubber insulated lead covered cable, to American Steel & Wire Co., 231 South La Salle St., $3,822. Bids Oct. 15.

SURFACING MATERIAL—**Griggsville, Ill.**—City, 300 ft. 12- to 30-in. corrugated metal culvert pipe for use on Sect. 1-CS, to W. L. O'Neall Co., Springfield, $384; 685 tons traffic bound surface course material, to Missouri Gravel Co., LaGrange, $1.48 per ton. Bids Oct. 18.

†PUMPS — **Fort Leavenworth, Kan.** — Con. Q.M., high service pumps, Item A, to DeLaval Steam Turbine Co., 900 North Clinton Ave., Trenton, N. J., $6,050***Item B, to T. L. Dawson Co., 2035 Washington St., Kansas City, Mo., $8,300.

CABLES—**Boston, Mass.**—City, Dpt. Penal Institutions, City Hall Annex, furnishing, laying electric cables in Boston Harbor to House of Correction at Deer Island, to Dorgan Electric Co., 670 Bway., South Boston, $2,245. Awarded Nov. 6.

PIPE, LUMBER, LIME, etc. — **Braintree, Mass.**—See "Sewerage and Waste Disposal."

†TANKS—**Hingham, Mass.**—Public Wks. Officer, Navy Yard, Boston, furnishing, installing boiler and appurtenant equipment and insulate elevated hot water tanks, at Naval Ammunition Depot, day labor. Former bids rejected. Noted Oct. 11.

†PUMPING UNITS—**Vicksburg, Miss.**—U. S. Eng., Box 667, two 10 in. vertical electric pumping units, to Pomona Pump Co., Pomona, Calif., $1,197. Bids Oct. 31.

†STEEL PLATES and ROUNDS, etc.—**Vicksburg, Miss.**—U. S. Eng., Vicksburg, steel plates and steel rounds, to Gulf States Steel Co., Brown Manx Bldg., Birmingham, Ala., $1,118***23,118 ft. B.M. long leaf southern yellow pine lumber, to Robinson Lumber Co., Inc., Masonic Temple Bldg., New Orleans, La., $900***steel washers, hexagon nuts, carriage bolts, machine bolts and steel rivets, to Wright Bros. Hardware Co., Vicksburg, $1,044***600 pcs. galvanized copper bearing steel sheets, to C. T. Peterson Co., Inc., New Orleans, La., $732***40 sections acetylene and welding hose and 40 sections triple braided green oxygen welding and cutting hose, to Modern Eng. Co., 358 Madison Ave., Memphis, Tenn., $426*** 32 steel single roller chocks complete with wheels, to Empire Steel Castings, Inc., Box

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Materials, etc. (Continued)

458, Reading, Pa., $610***2,200 wire rope clips, to Wilcox, Crittenden & Co., Middletown, Conn., $345***ten 2,500 lb. kedge type anchors, to Mobile Stove & Pulley Mfg. Co., Ann St., Mobile, Ala., $1,810. Grand total $6,985. Bids Oct. 23, 24, 26, 27 and 30. Noted Oct. 16, 19 and 23.

FLUMES, etc.—**St. Louis, Mo.** — St. Louis Water Dpt., City Hall, 14 gage galvanized iron flumes and 20 ft. 14 gage smooth flumes, for Bd. Pub. Serv., to F. Tiemann Stove & Hardware Co., 210 Walnut St., $660 less 1 per cent cash (10 days). Bids Oct. 30***2 plum plungers for Water Dpt., to Fulton Iron Wks. Co., 1259 Delaware Ave., St. Louis Co., $1,115*** c.i. manhole frames and covers for Water Dpt. during year commencing Oct. 8, 1934, to Banner Iron Wks., 4560 Shaw Ave., at $3.75 per cwt., Bids Oct. 5.

†LUMBER — **Montana** — U. S. Eng., Kansas City, Mo., miscellaneous lumber for cabins on derrick boats, at Fort Peck Dam, to J. F. Sharp Lumber Co., 928 Henry Bldg., Seattle, Wash., $910. Est. $1,000. Bids Oct. 26.

†DRAGLINE MACHINERY—**Omaha, Neb.**— U. S. Eng., Natl. City Bank Bldg., to J. Boyne, Council Bluffs, Ia., rental of 1 dragline machine for 30 days or longer $17.50 per day***to Gordon Ingram Piling Co., Cape Girardeau, Mo., 1,960 pcs. crib lumber, 30 ft. long, f.o.b. Cairo, Ill., at 8c. per ft.***to C. E. McGlashan, Homer, 350 tons rip rap stone, f.o.b. Dakota City, $2 per ton***to Bradford-Kennedy Co., 3514 South 25th St., 12 pcs. 2x4 in. x 12 ft. softwood lumber and 60 pcs. 2x4 in. 10 ft. softwood lumber, at $44 per 1,000 ft.; 16 pcs. 1x4 in. x 10 ft. at $38 per 1,000 ft.; 3 pcs. 6x8 in. x 10 ft. at $52 per 1,000 ft.; 12 pcs. 2x8 in. x 10 ft. at $41 per 1,000 ft.; 265 ft. flooring S4S 1x4 in. at $51 per 1,000 ft.

†LUMBER — **Rulo, Neb.** — U. S. Eng., 232 Mfg. Exch. Bldg., lumber for matresses for Missouri River Improvement, to Addison Miller, 1111 Builders Exch. Bldg., St. Paul, Minn., $5,670. Est. $3,600. Bids Nov. 1, awarded Nov. 3.

†TURBO-ALTERNATOR—**Phila., Pa.**—Yards & Docks, Navy Dpt., Wash., D. C., turbo-alternator at Navy Yard, Spec. 7775, to Westinghouse Electric Mfg. Co., 5757 Trumbull St., Wash., D. C., $136,175. Bids Oct. 31. Noted Oct. 25.

†DRAGLINE—**Memphis, Tenn.**—U. S. Eng., P. O. Box 97, Memphis, furnishing dragline and operating crew, to Swinney & Coleman, Baton Rouge, La., $5.44 per hr. Estimated rental period 40 working days of 24 hrs. per day. Bids Oct. 22.

ELECTRICAL EQUIPMENT—**Seattle, Wash.** —Bd. P. Wks., to Westinghouse Electric & Mfg. Co., Lloyd Bldg., metal clad switchgear, $26,123; neutral circuit breakers, $6,926; oil purifying and testing equipment $5,929***to Graybar Electric Co., Occi and King Sts., wall bushings $235***to Star Mchy. Co., 1741 1st St., cell storage battery, $1,778***to Electrical Products Co., 1000 Virginia St., battery charging motor generator $1,450; inverter $806***to J. A. Roebling's Sons Co., 900 1st St., 75 sets armature coils $2,043. Grand total $45,290. Rejected bids Oct. 11, hydraulic meter equipment, telephone equipment, main unit instrument transformer, oil circuit breakers and disconnecting switches. Will readvertise. Light, power and heat switchboard and rectifier equipment held over. Bids Oct. 11. Noted Oct. 4.

CONCRETE PIPE—**Ottawa, Ont.**—City, concrete pipe, to Harry Haybey, Nicholols St., $15,847. Awarded Oct. 22.

PUMP — **Ottawa, Ont.** — City, Diesel driven vacuum pump, to General Supply Co. of Canada Ltd., Sparks St. Awarded Oct. 22. W. E. MacDonald, Ottawa, engr.

FOREIGN

Australia, Victoria—Imperial Chemical Industries, Ltd., 285 Madison Ave., New York, N. Y., plans hydrogenation plant (to utilize lignite deposits). To exceed $1,000,000. **Maturity indefinite.**

England—Sowerby Bridges Urban Council preparing plans power house and will be in market for equipment***Brighton** Town Council instructs S. N. Tiltman, 42 Middle St., Brighton, to prepare plans terminal buildings, hangars, aerodrome, etc., $600,000***Ilford** Town Council plans by L. E. J. Reynolds, hospital addition, $500,000***Ilford** Education Committee voted $600,000 for school at Redbridge***Golborne** Urban Council preparing plans 300 houses $442,500***Oldbury** Urban Council preparing plans 200 houses $300,000***Richmond on Thames** City Council preparing plans 120 houses, $250,000***Rotterham** Town Council, plans by Major Turner, public baths, $280,000***I. Stuart, Chelmsford, plans technical college for Essex Education Committee, **Walthamtaw,** $675,000.

England, Birmingham—Schrader's Sons, Inc., 470 Vanderbilt Ave., Brooklyn, N. Y., tire valve plant, here, separate contracts awarded. To exceed $40,000.

France, Rouen — LaSociete Anonyme des Petroles Juniper, Rouen, France, 2 Dubbs cracking units for Petit-Couronne refinery, separate contracts awarded. $500,000.

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Irish Free State—Limerick Local Government Bd., awarded contract addition to St. Marchus Hospital, to J. Gough, Limerick, $625,000*** South Tipperary County Bd. of Heal.h, **Cashel,** plans by V. Kelly, Dublin, hospital, $600,000 ***County Bd. of Health, **Clommel,** plans by V. Kelly, Dublin, hospital, $500,000.

New Zealand, Wellington—Jan. 29, by Director General Stores, Div. Posts & Telegraph Dpt., supplying 5,450 yd. cord instrument; 2,000 cord swtichboard; Feb. 19, by Secretary Public Works Supply & Tenders, outdoor steel work, incl. steel structure, disconnects and insulators stacks and spares, copper tube and connectors, switchboard, fuse resistance combination for Arapum Scheme of Henderson; Mar. 5, seven 8,000 kva. transformers and spares.

Union Socialist Soviet Republics—Bureau of Musical Industries, Commissariat of Light Industry, or c/o Amtorg Trading Corp., 261 5th Ave., New York, phonograph factory, 250,000 machines annual capacity, day labor. $500,000 or more.

Union Socialist Soviet Republics — Commissariat of Heavy Industry, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, constructing Zaporozhe steel mill at Dnieprostal, in Southern Ukraine Region. To exceed $1,000,000.

Union Socialist Soviet Republics—Commissariat of Heavy Industry, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, plans constructing Far Eastern steel mill, Far East. To exceed $5,000,000.

Union Socialist Soviet Republics—Commissariat Heavy Industry, Moscow, and c/o Amtorg Trading Corp., 261 5th Ave., New York, plans constructing tobacco and cigarette machinery plants at various locations. To exceed $2,000,000.

Union Socialist Soviet Republics — Commissariat Light Industry, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, rebuilding and reconditioning phonograph manufacturing factory, at Lenmgrad, day labor. $500,000.

Union Socialist Soviet Republics—Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., working and development of Topaz Deposit, in vicinity of Sverdlovsk, by day labor. To exceed $500,000.

Union Socialist Soviet Republics — Soviet Govt., Moscow, c/o Amtorg Trading Corp., 261 5th Ave., New York, plans developing 1,000 acre nitrate deposit, Khorezmski Oasis. $500,000. **Maturity indefinite.**

PUBLIC BUILDINGS

PROPOSED WORK

Calif., Sacramento—City plans clubhouse and swimming pool, McKinley Park. $150,000. To be financed with funds bequeathed by late Mrs. Clunie.

Calif., San Bernardino—San Bernardino Co. plans by De Witt Mitcham, 288 Highland Ave., public building for emergency relief and public health purposes, 3rd St. and Arrowhead Ave. $275,000. County officials will submit plans to SERA with application for funds to finance same.

Calif., South Pasadena—South Pasadena Bd. Educ., commissioned Marsh, Smith & Powell, archts., 816 West 5th St., Los Angeles, to prepare plans for reconstruction work at Southern Pasadena high school, incl. shop building, fine arts and music building, science and household economy building, removal of 3rd story of main building and strengthening building, demolishing of buildings and incidental fees, $163,000.

Calif., San Francisco—City and San Francisco Co., plans being completed by L. P. Hobart, Crocker Bldg., and Bliss & Fairweather, Balboa Bldg., for 2 story, rein.-con. school, 14 classrooms, auditorium, 450 to 500 persons seating capacity, Brompton St. R. L. St. John, 544 Market St., mechanical engr. J. B. Leonard, 677 10th Ave., structural engr.

Calif., San Leandro—San Leandro School Dist. plans election to vote bonds new school, to house pupils of 7th and 8th grades. $125,000.

Ill., Belleville—St. Clair Co. defeated $175,000 bonds, brick, steel, rein.-con., stone jail. $230,000 allotted by P.W.A. Noted Aug. 23.

Ia., Sheldon—Election Nov. 27, on question of establishing, maintaining, operating municipal light and power plant and to issue $240,000 in revenue bonds to defray the cost thereof. H. L. Cory, 503 Baum Bldg., Omaha, Neb., consult. engr.

Ia., Waterloo—City called off election to have been held Nov. 20 to vote on $199,500 bond issue for constructing city hall and auditorium building, due to legal technicality involving acquisition of proposed site. No new date will be set until new site is selected. $285,000. P.W.A. allotted $190,000. Noted Oct. 25.

Ky., Burkesville—Cumberland Co. made application to State Public Service Comn. for permission to construct municipal power plant.

†Ky., Louisville — Housing Div., Public Works Administration, Wash. ,D. C., plans low cost housing and slum clearance, incl. 3 story apartments and 2 story row houses, on site bounded by Jefferson, Walnut, Shelby and Clay Sts. $1,500,000.

Me., Hebron—State, Dr. H. C. Hanscom, dir. Pub. Institutions, State House, Augusta, plans by Coombs & Harriman, 11 Lisbon St., Lewiston, 3 story, basement, irregular sized, brick health dormitory, concrete found., at Maine Sanatorium. $125,000-$150,000.

Mass., Barnstable — Barnstable Co. Court House, M. Crocker, sheriff, plans by Mason, 15 Prospect St., Leominster, brick, steel jail. Est. $105,000 or more. Nov. 1.

Mass., Lynn—City, Dpt. P. Buildings, City Hall, plans 3 story, basement, irregular brick, stone elementary school, concrete Highlands Sect. $300,000. Architect not pointed. Appropriation granted.

Mich., Mt. Pleasant—State, State Administrative Bd., Dpt. Buildings, Lansing, plans by Wetzel & Co., 2317 Dime Bank Bldg., for alterations and additions to 2 story, brick, steel training school buildings, brick, steel, stone and concrete buildings, about $130,000.

Mont., Billings — Eastern Montana Normal School plans by McIver & Cohagen, Bldg., and soon takes bids 2 schools. $50,000 P.W.A. project.

Neb., Columbus—Loup River Public Power Dist. making plans 2 electric power plants, 66 kv. and 110 kv.; 175 mi. power transmission lines, steel towers; 2 rein.-con. dams, 1,100 ft. long, 10 ft. high. Harza Mfg. Co., 205 West Wacker Dr., Chicago, Ill., engrs. Noted Oct. 18.

N. J., Bridgewater—Bd. Educ. soon takes bids school. $245,000. P.W.A. project. C. Vanhees, 16 Schuyler Pl., Morristown, archt. Noted Aug. 30.

N. Y., Keene Valley—Central School Dist. soon takes bids 2 story, basement, 127x149 ft. brick, steel central grade and high school, found., Market St. $183,000. P.W.A. project. C. W. Clark, State Theatre Bldg., Cortland, archt. Noted Apr. 5.

†N. C., Bricks—Dpt. Interior plans rehabilitation homestead project, incl. 100 homes in Edgecomb Co. $200,000. R. Browne, University of North Carolina, made survey of 1,000 acres.

†N. C., Henderson—Treas. Dpt. at office Sup. Archt., Wash., D. C., making plans U. S. Post Office addition. $35,000.

O., Cleveland—City soon takes bids furnishing, installing 6 electric controllers for draft fan and stoker motors for municipal light plant, F. H. Cover, 502 City Hall, engr. Noted July 26.

Okla., Muskogee—Municipality defeated $1,200,000 bonds, for electric light and power plant. Project abandoned. Noted June 7.

Okla., Shawnee—City, P. Watson, mayor, making plans rein.-con., brick auditorium and gymnasium. $105,000. P.W.A. project. T. E. Thompson, city mgr.

Pa., Corry—Corry General Hospital making plans remodeling heating system in nurses home, Corry General Hospital, incl. installation of new boilers, stokers, equipment. Mayer Valentine Co., 2036 East 22nd St., Cleveland, O., engrs.

R. I., Providence—State, H. P. Gross, State House, bids about Nov. 15, brick, steel, stone office building addition. $160,000. P.W.A. project. Noted Sept. 13.

R. I., Providence—City, School Com., plans by I. S. Gorman, City Hall, for Mt. Pleasant Senior High School, 3 story, brick, steel, limestone. Est. $1,500,000. P.W.A. project. Noted Jan. 25.

Tex., Brownsville — Brownsville Navigation Dist., c/o H. L. Yates, Brownsville, soon takes bids warehouses, docks, wharves, etc., as improvements at new Turning Basin, 4 mi. from here. $300,000. P.W.A. project. R. J. Cummins, Bankers Mortgage Bldg., Houston and Brownsville, engr.

Tex., Houston — City, c/o Secretary, plans submitted to P.W.A. for municipal and harbor improvements, incl. refrigeration, cold storage, oyster and shrimp storage and diesel power plant, also harbor improvements. $150,000. Garrett Eng. Co., 300 Houghes St., engrs.

Tex., Morton—See "Waterworks."

Wis., Loyal—Bd. Educ. School Dist. 1, H. F. Leschensky, clk., plans being completed by Parkinson & Dockendorff, LaCrosse, 2 story, 47x50 ft. school and 1 story, 60x104 ft. gymnasium. Will construct by FERA labor and purchase materials in near future.

Alta., Rimby—W. A. Saunders preparing plans for electric power plant, for Town.

Que., Montreal—Dpt. National Defence, Ottawa, Ont., plans by Ross & MacDonald, 1135 Beaver Hall Hill, armoury for 17th Duke of York, Royal Canadian Huzzars. Noted Oct. 11.

BIDS ASKED

†Ala., Russellville—Nov. 30, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†Calif., Redwood City—Dec. 10, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†Calif., Santa Paula—Dec. 5, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

Calif., Sebastopol—Trustees of Analy Union High School Dist., taking bids 2 story, rein.-con. high school. $200,000. L. C. Stone & J. R. Rowell, Humboldt Bank Bldg., San Francisco, archts. N. Green, 5 New Montgomery St., San Francisco, engr. Noted Aug. 23.

†Federal Government.

Public Buildings (Continued)

D. C., Wash.—Nov. 27, by District Comrs., District Bldg., constructing Georgetown Branch Library. $140,000.

†**Del., Laurel**—Nov. 30, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office; adv. E.N.-R. Nov. 15.

†**Ga., Calhoun**—Nov. 27, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $55,000. Noted Sept. 6.

†**Idaho, Burley**—Dec. 4, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $77,000.

†**Ill., Gillespie**—Nov. 22, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. (**Correction**—Date of bids.)

†**Ill., Urbana**—Nov. 27, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office. Noted Aug. 9.

†**Ill., Vandalia**—Nov. 26, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000. Noted Aug. 16.

†**Ind., Culver**—Nov. 21, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office; adv. E.N.-R. Nov. 15.

†**Ind., New Albany**—Nov. 30, by Treas. Dpt. at office Sup. Archt., Wash., D. C., altering and constructing post office addition.

†**Ia., Osceola**—Nov. 27, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office; adv. E.N.-R. Nov. 15.

†**Kan., Lindsborg**—Dec. 4, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $60,000.

Ky., Lexington—Nov. 19, by Bd. Educ., elementary school. To exceed $150,000. P.W.A. project. W. W. Haffler, 414 Fayette Park, archt. Warner & Mitchell, Lexington, consult. archts.

†**Me., Houlton**—Nov. 26, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 2 story, basement, brick, stone, granite post office and custom house, Court and Military Sts. $95,000; adv. E.N.-R. Nov. 15.

†**Me., Togus**—Jan. 3, by Vet. Bu., Arlington Bldg., Wash., D. C., constructing additional buildings and utilities.

†**Me., Westbrook**—Nov. 27, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Sept. 13.

Md., Crownsville—Nov. 20, by Crisp & Edmunds, archts., 409 Calvert Bldg., Baltimore, 3 story, basement, brick, rein.-con. administration building, boys' cottage, girls' cottage, connecting tunnels, passages and utility distribution house, plain found., for Crownsville State Hospital. $300,000. Noted Feb. 1.

Md., Cumberland—Nov. 23, by Allegheny Co. Bd. Educ., South Centre St., for Junior-Senior High School, 3 story, basement, $750,000. R. H. Hitchens, Cumberland, archt. P.W.A. project. Noted Oct. 25.

Mo., Kansas City—Nov. 22, by Bd. Educ., County Bldg., for Lincoln High School, 3 story, basement, brick, steel, stone, 21st and Woodland Ave. $600,000. C. A. Smith, 317 Finance Bldg., archt. Noted Nov. 8.

Mont., Kalispell—Flathead Co. School Dist. bids about Dec. 15, constructing 3 units, incl. Unit 1, classroom, shop, auditorium; Unit 2, converting present shop building into gymnasium. Unit 3, remodeling school building. $210,000. P.W.A. project. F. A. Brinkman, Kalispell, archt. Noted Sept. 27.

Neb., Columbus—See "Earthwork, Irrigation, Drainage and Waterways."

†**N. J., Boundbrook**—Nov. 30, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†**N. M., Raton**—Dec. 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office; adv. E.N.-R. Nov. 15.

†**N. M., Sante Fe**—Dec. 6, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office; adv. E.N.-R. Nov. 15.

†**N. Y., Ballston Spa.**—Nov. 30, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 2 story, basement, brick, steel U. S. Post Office, plain found., $62,700. Noted Oct. 25.

†**N. Y., Hoffman Island**—Nov. 30, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing detention hospital at U. S. Quarantine Station; adv. E.N.-R. Nov. 15.

†**N. Y., Riverhead**—Dec. 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Oct. 6, 1932.

†**O., Booneville**—Nov. 23, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†**O., Loudonville**—Nov. 21, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office; adv. E.N.-R. Nov. 15. $65,000.

†**O., Orrville**—Nov. 23, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office; adv. E.N.-R. Nov. 15.

†**O., Portsmouth**—Nov. 30, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 3 story, basement, brick, steel post office. $320,000. Noted Oct. 4.

†**O., Sidney**—Dec. 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., altering and extending U. S. Post Office; adv. E.N.-R. Nov. 15.

†**O., Wapakoneta**—Nov. 22, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $72,000.

†*Federal Government.*

†**Ore., Baker**—Dec. 12, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office.

†**Pa., Clarion** — Nov. 30, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†**Pa., Doylestown**—Nov. 26, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†**Pa., Phila.**—Nov. 21, by Yards & Docks, Navy Dpt., Wash., D. C., re-roofing Buildings 69, 79 and 87, at Navy Yard Aircraft Factory, Navy Yard, Spec. 7796.

†**Pa., Pittsburgh**—Nov. 21, by Treas. Dpt. at office Sup. Archt., Wash., D. C., weatherstripping exterior doors, U. S. Marine Hospital.

†**Tex., Abilene**—Dec. 12, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 3-4 story, basement, 115x156 ft., brick, limestone federal building. $300,000. D. S. Castle Co., 1082½ West 1st St., Abilene, and G. Willis, Builders Exch. Bldg., San Antonio, archts. W. E. Simpson, Milam Bldg., San Antonio, engr. Noted May 11, 1933.

†**Tex., Randolph Field**—Con. Q.M., taking bids 1 story, 24x76 ft., automobile service building.

†**Tex., Sabine Pass**—Dec. 4, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing buildings, wharf, etc., incl. grading, at U. S. Quarantine Station; adv. E.N.-R. Nov. 15. Noted Feb. 8.

†**Wis., West Bend**—Dec. 5, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, etc.; adv. E.N.-R. Nov. 15. Noted Oct. 19, 1933.

†**Wis., Whitewater**—Nov. 21, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office; adv. E.N.-R. Nov. 15. $62,000.

†**C. Z., France Field**—Nov. 30, by Con. Q.M., Panama Canal Dpt., Quarry Heights, constructing dispensary and non-commissioned officers quarters, at France Field; adv. E.N.-R. Nov. 15.

LOW BIDDERS

†**N. Y., New York**—Treas. Dpt. at office Sup. Archt., Wash., D. C., Nov. 9, constructing 9 story U. S. Post Office, from James Stewart, 230 Park Ave., $5,597,000. Noted Nov. 1.

CONTRACTS AWARDED

Calif., Compton—Compton Union High School Dist., 2 story, 190x225 ft., rein.-con., structural steel, tile administration building, to Bannister-Field Co., 4101 Goodwin Ave., Los Angeles, $268,863. P.W.A. Awarded Oct. 30.

†**Calif., Eureka**—Yards & Docks, Navy Dpt., Wash., D. C., remodeling extension at U. S. Naval Radio Station, Spec. 7754, to F. W. Snook Co., 596 Clay St., San Francisco, $5,319.

Calif., Los Angeles—Los Angeles Bd. Educ., reconstructing, rehabilitating, strengthening administration building and kindergarten at 79th St. School, involving installation of concrete framing, anchors, bracing, plastering, rebuilding walls, rehabilitating building in general, 79th St. and McKinley Ave., to Dick Bros., 7702 Western Ave., $78,477. Awarded Oct. 30. P.W.A. F. D. Hudson, 701 Laughlin Bldg., archt. R. A. De Line, 1144 South Grand Ave., engr.

†**Calif., Point Montara**—Yards & Docks, Navy Dpt., Wash., D. C., heating system at Naval Direction Finder Station, to O'Mara & Stewart, 218 Clara St., San Francisco, $2,974.

†**Calif., Point Reyes**—Yards & Docks, Navy Dpt., Wash., D. C., heating system, Spec. 7756, at U. S. Naval Direction Finder Station, to M. F. Reeves Heating Co., 959 Natoma St., San Francisco, $3,747.

Conn., Monroe—Town, School Comn., excavating for 1 story, basement, 65x190 ft., brick school, to G. Byelas, Long Hill***iron, to McCathron Boiler Wks., 72 Knowlton St., Bridgeport***reinforcing steel, to Hunter & Havens, 239 Water St., Bridgeport***marble, to Central Marble & Tile Co., 56 Sanford St., Hartford. P.W.A. Noted Aug. 30, under "Contracts Awarded."

†**Ill., Danville**—Vet. Bu., Arlington Bldg., Wash., D. C., altering and constructing additions to U. S. Veterans Hospital buildings, to E. W. Sproul Constr. Co., 2001 West Pershing Rd., Chicago, $356,699. Noted Sept. 6.

Ill., Highland—Kellerman Contg. Co., general contractors, 625 North Euclid Ave., St. Louis, Mo., brick work for 2 story, basement, 88x280 ft. and 73x73 ft., brick, rein.-con. school, to Reinschmidt Bricklaying Co., 1615 Prather St., St. Louis, Mo.; roofing, to Litchfield Roofing & Sheet Metal Co., Litchfield, for School Dist. 15 of Madison Co., c/o Bd. Educ. Noted Oct. 25, under "Contracts Awarded."

Ill., Rock Island—Bd. Educ., E. F. Burch, clk., general contract Longfellow School, 2 story, basement, 65x180 ft., brick, steel, to T. S. Willis, Janesville, Wis., $99,874***plumbing, to Channon & Dufva Co., Rock Island, $8,882*** heating, to Kale-McKay, Rock Island, $16,574 ***electrical work, to Blackhawk Electric Co., Rock Island, $5,299. Grand total $130,629. Bids Aug. 25. P.W.A.

†**Ill., Wood River**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to A. Smith & Co., 134 North LaSalle St., Chicago, $35,330. Bids Oct. 30. Noted Oct. 11.

Ind., Hobart—Town, heating plant for city hall, fire house, and comfort station, to G. C. Bruce, Gary. Est. $17,750. Bids Oct. 31. Noted Oct. 25.

†**Md., Cambridge**—Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office, to Cambridge Brick Co., Cambridge, $31,974. Bids Oct. 29.

Mass., Harding—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, rewiring and fixtures at power plant addition, Medfield State Hospital, to Mass. Electric Constr. Co., 333 Washington St., Boston, $25,-386. Bids Sept. 21, awarded Nov. 8. P.W.A. Noted Sept. 13.

Mass., Medfield — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, power plant improvements, incl. wiring and equipment at Medfield State Hospital, to Electric Constr. Co., 333 Washington St., Boston, $25,386. P.W.A.

Mass., Wellesley—Town, P. W. Taylor, North School Dist., Town Hall, 2 story, basement, 67x129 ft. school, incl. heating, plumbing, electrical work, Washington and Walnut Sts., to D'Amore Constr. Co., 89 State St., Boston, $136,-800. P.W.A. Bids Oct. 24, awarded Nov. 7.

Mass., Worcester — M. S. Kelliher Co., 38 Chauncy St., Boston, general contractors, excavating for 2½ story, 115x130 ft. hospital, to R. E. Cunniff, 393 Brookline Ave., Newton*** reinforcing steel, to Truscon Steel Co., 38 Chauncy St., Boston***limestone, to Hiltonville Limestone Co., Bedford, Ind.***structural steel-iron, to United Structural Steel Co., 10 Nashua St., for City Belmont Hospital. Noted Oct. 11, under "Contracts Awarded."

†**Minn., Ah Gwah Ching**—Dpt. Interior, Wash., D. C., general contract 4 story, 41x180 ft. hospital and 1 story, 50x80 ft. garage, to Fleisher Eng. & Constr. Co., 300 Minnesota Bldg., St. Paul, $210,000. Bids Oct. 12. Noted Sept. 20.

†**Minn., Fort Snelling**—Con. Q.M., constructing 1 quartermaster warehouse, to H. B. Kilstofte, Winona, $50,974. Bids Oct. 12. Noted Oct. 4.

†**Montana**—U. S. Eng., Kansas City, Mo., poles, guy cable, anchor rods, machine bolts, and reinforcing materials for wind bracing substation building, Schedule 1, to B. F. Vreeland, 515 Boston Bldg., Denver, Colo., $323*** Schedule 2, except Item 21, to Louis Electric Corp., 15 Warren St., New York, N. Y., $383*** and Item 21, Schedule 2, to Bunting Hardware Co., 810 Walnut St., Kansas City, Mo., $121. Grand total $827. Est. $1,000. Bids Oct. 27, awarded Oct. 31.

Neb., Palmyra—City, electrical wiring for new brick school, to A.B.C. Electric Co., Lincoln, $797. P.W.A. Noted Oct. 18, under "Contracts Awarded."

†**N. J., Bergenfield**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Structural Eng. Co., 122 East 42nd St., New York, $35,810. Bids Sept. 26. Noted Sept. 13.

N. Y., New York—Turner Constr. Co., general contractors, 420 Lexington Ave., one piece canopy doors for Bronx Terminal Market, to Cornell Iron Wks., Inc., 3600 13th St., Long Island City, for Dpt. Parks, Municipal Bldg. Noted Sept. 27, under "Contracts Awarded."

O., Columbus—J. McSweeney, dir. P. Welfare, State Office Building, 500 hp. steam generating unit and stoker complete, considerable brick work to be installed in Ohio Penitentiary, to Babcock & Wilcox Co., Koppers Bldg., Pittsburgh, Pa., $46,291. Bids Oct. 22, awarded Nov. 3. Noted Oct. 18.

O., Hillsboro—Bd. Educ., E. E. Holt, supt. heating 2 story, basement school, Main St., to J. F. Stephens, 2523 Scott Trail, Portsmouth, $17,460; ventilating, to Harvey De Porter, 854 Euclid Ave., Dayton, $4,400. P.W.A. Bids June 25. Noted July 12.

Okla., Pawnee—City, installing two 450 B hp. diesel oil engines with generators, switchboard and electrical equipment and station wiring, foundations for engines, structural steel, oil storage tank, piping, etc., at Municipal Power Plant, to Mattison & Wallock, Tulsa, $61,400. P.W.A. Bids Oct. 24. Noted Oct. 4.

Ore., Corvallis—City, general contract Union High School, to Ross N. Hammond, Spaulding Bldg., Portland, $279,000. Bids Oct. 9. Noted Sept. 27.

†**Pa., Gettysburg**—Dpt. Interior, at office Superintendent Natl. Military Park, constructing utility building, to A. W. Warner & Son, Waynesboro, $35,876. Bids Oct. 11. Noted Sept. 27.

†**Pa., Phila.** — Yards & Docks, Navy Dpt., Wash., D. C., extending administration building, Spec. 7719, to Rafferty Kennedy Co., 1313 West Luzerne St., $62,479. Bids Oct. 31. Noted Oct. 18.

S. D., Sioux Falls—City, general contract 3 story, 113x130 ft., brick, steel city hall, to Olson Constr. Co., 704 Stuart Bldg., Lincoln, Neb., $248,848*** plumbing and heating, to C. E. Carlson, 258 Boyce-Greeley Bldg., $53,421 ***wiring, to Electric Constr. Co., 322 South Phillips St., $21,576. Grand total $323,845. P.W.A. Bids Oct. 29. Noted Oct. 11.

†**Tex., Dalhart**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Murch Bros. Constr. Co., Railway Exch. Bldg., St. Louis, Mo., $39,426. Bids Oct. 23. Noted Oct. 11.

†**Tex., Kingsville**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Murch Bros., 4111 Lindell Blvd., St. Louis, Mo., $39,100. Bids Oct. 25. Noted Oct. 11.

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Public Buildings (Continued)

†**W. Va., Parkersburg**—Treas. Dpt. at office Supt. Archt., Wash., D. C., general contract U. S. Court House, to David Gordon Building & Constr. Co., 3493 Burnet Ave., Cincinnati, O., $45,324. Bids Oct. 25. Noted Oct. 4.

Man., Winnipeg—Dpt. P. Wks., Ottawa, Ont., new hospital wing at Deer Lodge Hospital, to J. E. Conture & E. Taupin, Winnipeg, $114,000. Awarded Oct. 19. Noted July 26.

Ont., Brockville—C. S. Walters, deputy minister Dpt. P. Wks., Toronto, supplying structural and reinforcing steel for 1 story power plant addition at Ontario Hospital, to Hamilton Bridge Co. Ltd., Hamilton. Awarded Oct. 31. Noted Sept. 27, under "Contracts Awarded."

Ont., London—Canadian Natl. Railway, T. T. Irving, ch. engr., Union Sta., Toronto (1st unit) 100x200 ft. brick, steel, concrete, underground concourse, tracks, etc. in connection with new station, to W. H. Yates Constr. Co., 17 Main St. E., Hamilton, $180,000. Noted Aug. 30.

Ont., Ottawa—Dpt. P. Wks., Ottawa, supplying, installing hot water heating equipment in Parliament Buildings, to W. G. Edge Ltd., Gloucester St., $9,950. Est. $11,000. Awarded Oct. 30. T. W. Fuller, Ottawa, archt.

COMMERCIAL BUILDINGS

PROPOSED WORK

Ala., Birmingham—Loveman, Joseph & Loeb, plans by W. F. Lehman, 972 Broad St., Newark, N. J., and takes bids in 2 weeks department store. $500,000.

Mich., Detroit—R. E. Olds, Lansing, plans by C. Howard Crane, Inc., 112 Madison Ave., 4 story, basement, brick, rein.-con., steel office, plain found., Campus Martins St. Est. about $250,000.

N. J., Teaneck—Garden State Housing Corp., c/o G. Hitchcock, Phelps Manor, plans group 100 brick dwellings, near River Rd. To exceed $150,000.

N. Y., Brooklyn—Brooklyn Polytechnic Institute, 85 Livingston St., plans constructing limited dividend low-cost housing project at 4th and 5th St., 4th and 5th Aves. Will be constructed under supervision of Housing Div. Est. about $2,120,000. $1,670,000 allotted by P.W.A.

N. Y., Brooklyn—Five Thousand Eight Hundred One 14th Ave., Inc., 291 East 3rd St., plans by Seelig & Finkelstein, 153 Pierrepont St., 6 story, brick apartment, 587 Ocean Ave. $175,000.

N. Y., Brooklyn—E. L. Verran, c/o Scacchetti & Siegel, archts., 1860 Bway., New York, plans 6 story, brick apartment, Seagate, Atlantic Ave. and Beach 42nd St. $500,000.

N. Y., Flushing—L. Bright, 189th St. and 47th Ave., plans residential development, incl. group brick, frame dwellings, 189th St. and 47th Ave. To exceed $100,000.

N. Y., Flushing—L. Levy & M. Sass, 172nd St. and 34th Ave., plans group forty 1 and 2 story, brick, frame dwellings. To exceed $100,000. Architect not appointed.

N. Y., Flushing—Morris Goldfine, H. Kasper and H. Rosen, plan constructing 2nd and 3rd units, brick, frame dwellings, 58th Rd. and Main St. To exceed $100,000.

N. Y., New York—Landboro Realty Corp., 34 East 149th St., plans by Sampson & Levy, 341 East 149th St., altering plumbing, heating, in two 4 story, brick apartments, 333 East 69th St. $28,000.

N. Y., New York—Metropolitan Life Insurance Co., 1 Madison Ave., plans by D. E. Waid, 1 Madison Ave., and E. Roth, 18 East 45th St., altering, ventilating and heating system in 6 story apartment, 1 West 30th St. $35,000.

N. Y., New York—I. Nicktuser, 108 Clark Pl., plans by D. and L. Levy, 527 5th Ave., altering plumbing, heating and fire escapes, 5 story apartment, 16 St. Marks Pl. $30,000.

N. Y., New York—Corporation, c/o I. Nichthauser, 108 Clark Pl., plans plumbing and heating alterations on two 5 story apartments, 109 West 82nd St. $29,000 or more.

N. Y., Syracuse—New York Central R.R. Co., J. W. Pfau, ch. engr., 466 Lexington Ave., rejected bids foundation piers for passenger station. $30,000. Noted Sept. 20.

O., Cleveland—Wm. Daniels, Inc., c/o Wm. Daniels, 15800 Detroit Ave., plans by Steffens & Fox, 1940 East 6th St., one hundred and fifty 2 story, basement, 24x26 ft., frame houses, Bay Village. Est. $4,500 each.

O., Wooster — Wooster College, C. F. Wishart, pres., plans fireproof girl's dormitory on college campus to be known as Babcock Hall, gift of B. E. Babcock, of Phelps, N. Y. $200,000. **Maturity in spring.** Architects not appointed.

R. I., Providence—Roger Williams Memorial Assn., Providence, Rhode Island Tercentenary Comn., sketches by A. Harkness, 1428 Industrial Trust Bldg., Roger Williams Memorial, incl. building and park, Congdon and Prospect Sts. $325,000.

Tex., Dallas—Hoblitzelle Holding Co., plans theatre, Preston Rd. and Mocking Bird Lane. $125,000. Flippen-Prather Realty Co., lessees.

Tex., Houston—Will Horwitz Theatres Inc., Houston, plans by H. F. Jonas & Tabor, Union Natl. Bank Bldg., 4 story, basement, 80x120 ft., brick, concrete theatre, Capitol Ave. Est. $250,000.

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R. I., Central Falls — Holy Cross Roman Catholic Parish, High St., plans church. $105,000. Architect not appointed.

Tex., San Antonio — Young Men's Hebrew Assn., c/o H. Levin, 118 East Mulberry St., chn. Building Com., plans 2 story, basement, 75x167 ft. Jewish synagogue, 112 East Quincy St. $125,000. Architect not appointed.

BIDS ASKED

N. J., Roselle — Nov. 17, by St. Joseph's Church, church, $200,000. A. F. Durang, 238 East 47th St., New York, archt. Noted Aug. 30.

N. Y., Jamaica—See "Contracts Awarded."

CONTRACTS AWARDED

Conn., West Hartford (br. Hartford)—Southern New England Telephone Co., Church St., New Haven, plumbing for 2 story, basement, 70x80 ft. telephone building, to L. Lyon & Sons, 20 Central Row, Hartford***excavating, to R. H. Cone, 85 Lancaster Rd.***heating, to Wm. B. Carson, Inc., 220 Sargeant St., Hartford***electrical work, to Bauer & Co., Inc., 440 Asylum St., Hartford***ornamental iron, to Bradley & Hubbard, Hanover St., Meriden*** rein.-struct. steel, to Topper & Griggs, 200 North Main St.***metal windows, to S. H. Pomeroy Co., 280 East 134th St., New York ***structural gypsum, to Structural Gypsum Co., 30 Rockefeller Plaza, New York***millwork, to Hartford Builders Finish Co., 34 Potter St., Hartford***tile and marble, to White & Clark, Inc., 32 Ford St., Hartford. Noted Nov. 8, under "Contracts Awarded."

Ind., Indianapolis—L. S. Ayres, 1 West Washington St., 6 escalators for department store remodeling, to Otis Elevator Co., 1325 North Capitol St., $145,000. Noted Sept. 13, under "Contracts Awarded."

O., Shaker Heights (br. Cleveland)—Square Theatre Building Corp., c/o S. Horowitz, Union Trust Bldg., general and separate contracts for or later, general and separate contracts for theatre. Est. $250,000. J. Eberson, 370 Lexington Ave., New York, engr.

N. Y., Binghamton—Our Lady of Lourdes Memorial Hospital, general contract hospital, to P. Pavia, 17 Emerson Pl., Binghamton, $159,700 ***heating and ventilating, to M. E. Lewis, 1 State St., $26,654***plumbing, to T. J. Cronin, Binghamton, $17,963***electrical work, to E. Davis, 64 Conklin St., $16,927. Grand total $221,244. Bids Oct. 10. Noted Oct. 4.

N. Y., Jackson Heights—Apex Homes, 3744 82nd St., group of dwellings, 77th St. and 31st Ave., separate contracts awarded. $110,000. M. Rothstein, 391 Fulton St., Brooklyn, archt. Noted Nov. 1.

N. Y., Jamaica—Architectural Building Corp., 137-67 Queens Blvd., Queens Village, constructing group 32 brick dwellings, 219th St. and 113th Dr., separate contracts now being awarded. A. MacLean, 153-39 Jamaica Ave., archt.

N. Y., Jamaica—Sidon Corp., 160 16th Ave., group 2 story, 33x51 ft. dwellings, Henley and Eson Rds., separate contracts now being awarded. To exceed $100,000. Noted Nov. 1.

N. Y., Long Island City—Forty-Second Street Building Corp., 940 East 9th St., Brooklyn, 6 story, 85x190 ft., brick apartment, 43rd St. and 47th Ave., separate contracts now being awarded. $200,000. Cohn Bros., 191 Joralemon St., Brooklyn, archt. Noted Nov. 1.

N. Y., New York—Cathedral of St. John the Divine, Amsterdam Ave. and 112th St., cathedral addition (Womens Transept), to Edward Bell, 110th St. and Amsterdam Ave. Est. $500,000 for this part of work, owner plans to spend $137,000 at this time.

N. Y., St. Albans—Excelo Homes, 124-17 109th Ave., Richmond Hill, group dwellings, 118th Ave. and 219th St., separate contracts awarded. Plumbing, to H. Bohansky, 118th Ave. and 219th St. A. Allen, Garden City, archt. Noted Nov. 1.

N. Y., St. Albans—Murdock Homes, Woodside, group dwellings, 227th St. and 116th Ave., separate contracts now being awarded. To exceed $100,000. A. Faber, c/o owner, archt. Noted Nov. 1.

Wis., Sinsinawa—Dominican Sisters, 3 story, 35x60 ft., brick, steel convent addition, plain found., to R. F. Conlon, Dubuque, Ia. F. Riley & Lewis Sibertz, Madison, archts.

Ont., Toronto—Redfern Constr. Co., Ltd., general contractors, Excelsior Life Bldg., electrical work for 5 story, 100x100 ft. office, to Canadian Comstock Co. Ltd., 80 King St. W.***plumbing, to Sheppard & Abbott, 119 Harbord St.*** heating, to Purdy Manselle Ltd., 63 Albert St., for Imperial Bank of Canada, 32 Wellington St. Noted Oct. 4, under "Contracts Awarded."

Ont., Toronto—Imperial Bank of Canada, 32 Wellington St., structural steel for 5 story, 100x100 ft. office, to Hamilton Bridge Co. Ltd., Hamilton***heating, to Purdy-Mansell Ltd., 63 Albert St.***wiring, to Canadian Comstock Co. Ltd., Star Bldg. Est. $600,000. Noted Oct. 4.

Ont., Toronto—Sisters of St. Joseph, Sunnyside Ave., general contract 4 story, 40x200 ft., concrete, brick, stone nurses residence, to Pigott Constr. Co., Ltd., Pigott Bldg., Hamilton, structural steel to Hamilton Bridge Co. Ltd., Hamilton. Est. $250,000.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ala., Russellville — WAREHOUSE — Keeton Warehouse Corp., plans cotton storage warehouse. $30,000 or more. Architect not appointed.

California — SERVICE STATIONS — General Petroleum Corp., 519 19th St., Oakland, completing plans steel, concrete service stations at 16th and E Sts., and 422 16th St., Sacramento, and at Lincoln and Park Sts., Alameda. Est. $10,000 each. Private plans.

Calif., Fillmore—PACKING PLANT—Fillmore Citrus Assn. soon lets contract 100x180 ft. packing plant, general contract includes all work except electric wiring, plumbing, painting and steam heating which will be done locally, also air conditioning system. $60,000. R. C. Wilson, Say Rd., Santa Paula, archt. Noted Oct. 18.

Calif., Los Angeles—SHOP, etc.—Transcontinental Rest Cabins, Inc., c/o C. T. Graves, 350 Madison Ave., New York, will not build shop, garage, etc. $50,000 or more. Project abandoned. Pennington, Lewis & Mills, 250 Park Ave., New York, archts. Noted Apr. 19.

Calif., Sanger—DISTILLERY—Romeo Maiatesta, 529 Bway., New York, plans distillery, Fresno Co. To exceed $30,000. Federal permit granted.

Calif., Upper Lake — BOTTLING PLANT — C. C. McMahon, Bartlett Springs, plans rebuilding bottling plant. To exceed $35,000.

Colorado — MINING DEVELOPMENT — Shafter Mining Co., F. I. Collom, Idaho Springs, pres., plans development of mining property, various locations and purchase of equipment. To exceed $60,000.

D. C., Wash. — GARAGE, etc. — Transcontinental Rest Cabins Inc., c/o C. T. Graves, 350 Madison Ave., New York, will not build garage, shop and cabins. To exceed $50,000. Project abandoned. Pennington, Lewis & Mills, 250 Park Ave., New York, archts. Noted Mar. 15.

Ill., Belleville — DISTILLERY — Corporation, c/o H. Hartman, Belleville, plans distillery, $30,000 or more.

Ind., Allisonville—PLANT—Safety Air Transportation Co., A. Williams, supt., making plans airplane assembly plant on Allisonville Pike. $36,000.

Ia., Ogden—COMPRESSOR BOOSTER STATION—Northern Natural Gas Co., plans compressor booster station. $35,000 or more.

Kan., Russell—LUMBER STORAGE, etc.—Houston-Doughty Lumber Co., Newton, plans lumber storage and yards. $28,000 or more.

Ky., Covington — CAR BARN — Cincinnati, Newport & Covington Ry. Co., Covington, plans car barn additions. $150,000.

Ky., Frankfort—PLANT—Cove Spring Distilling Co., 20 West 40th St., New York, plans distillery plant. To exceed $30,000. Federal permit granted.

La., New Orleans—ICE PLANT—Metairie Ridge Ice Co. Inc., Labarre Rd., plans new 40 ton ice plant, brick. $40,000. A. Pailet, engr.

La., Shreveport—BREWERY—Jackson Brewing Co., 620 Decatur St., New Orleans, plans by J. F. Boreland, New Orleans, brewery with 20 bbl. hourly capacity or 100,000 bbl. per year. $200,000.

Md., Lansdowne — DISTILLERY — Monumental Distillery, G. Rudolph Vincenti, pres., Monumental Station, plans distillery, Monumental Station. To exceed $35,000.

Mich., Detroit—PLANT—Winslow, Baker, Mayering Co., c/o Copeland Refrigeration Co., Mt. Clemens and Trupar Mfg. Co., 116 Davis Ave., Dayton, O., lessees, plans altering and reconditioning old Lincoln Motors Plant, for refrigeration manufacturing. To exceed $28,000 with equipment.

Mich., St. Clair—DISTILLERY—North American Distillers, E. A. Loveley, pres., plans distillery. To exceed $200,000.

Mich., Wakefield—SAWMILL, etc.—R. Connor Co., Marshfield, Wis., plans sawmill and lumber plant, Connorville, in vicinity of here. To exceed $28,000.

Minn., Shakopee—DISTILLERY—Northwestern Distillery, Inc., D. B. Davis, plans converting former Nyssen brewery into distillery. $50,000.

Miss., Jackson—PLANT—N and W Overall Co., South President St., plans 2 story, 50x60 ft. addition. $30,000 or more.

Mo., Kansas City—BREWERY—Eagle Bottling Wks., 1901 Cherry St., plans by A. B. Anderson, 201 Grand St., 4 story brewery. G. Wentzel, Davidson Bldg., engr. To exceed $100,000.

Mo., St. Joseph—PACKING PLANT—Morris & Co., plans repairing packing plant. To exceed $28,000. Architect not appointed.

Mo., St. Louis—PACKING PLANT—H. Sokolik Packing Co., 1719 North Vandeventer Ave., rejected bids 1 story, 18x31x46x79 ft., concrete, brick addition, Vandeventer Ave. and Cote Brilliante Ave. $45,000. Project indefinitely postponed. Noted Oct. 11.

Mo., Wellston—SHOP and GARAGE—Welsco Motor Co., 6500 Easton Ave., plans shop and garage. Est. about $30,000 with equipment.

Neb., Omaha—PLANT—Firestone Tire & Rubber Co., 2566 Farnam St., making plans 2 story, basement, 142x187 ft., brick plant, incl. electric freight elevator, etc., 20th and Harney Sts. $125,000. Private plans.

N. J., Newark — BREWERY — Gottfried Kruger Brewing Co., 75 Belmont Ave., plans by Waldemar Mortensen, 103 Park Ave., New York, brewery. $200,000. **Maturity in December.**

N. Y., Bayside—DRY CLEANING PLANT—Lynn-39th Avenue Corp. and Bayside Dye Wks.,

†*Federal Government.*

Industrial Buildings (Continued)

39th Ave. and 170th St., bids after Mar. 1, general contract altering and extending dry cleaning plant, 39th Ave. and 170th St. $28,000 with equipment. I. Fenichel, 724 5th Ave., New York, archt. Noted Nov. 1.

N. Y., Hammel—ICE MANUFACTURING—Murray Ice Co., J. R. Murray, pres., plans ice manufacturing plant, Beach 79th St., Rockaway Beach. To exceed $28,500. Architect not appointed.

N. Y., Baldwinsville — FLOUR MILL and BAKERY—United Baking Co., Schenectady, soon lets contract altering flour mill and bakery, $30,000 or more with equipment.

N. Y., New York—MEAT STORAGE, etc.—New York Central R.R. Co., W. J. Pfau, ch. engr., 466 Lexington Ave., plans by H. Schneider, c/o owner, 4 story, 67x102 ft. meat storage and distribution, 445 West 13th St. $100,000.

N. Y., New York—PRINTING and STORAGE—Belvedere Estates, L. A. Kiesling, pres., 690 8th Ave., plans by T. W. Golding, 607 5th Ave., altering loft, printing, and storage building, $35,000.

N. Y., New York—STORAGE—Museum Estates, Inc., 14 Wall St., plans by W. H. Hohauser, 1841 Bway, altering two storage buildings, one 3 story, and other 19 story, brick, steel, 170 Nassau St. $40,000.

N. Y., New York—PLANT—Machlin Bros. & Bossow, Inc., c/o 3. D. Bassow, 475 5th Ave., plans scrap iron and bundling plant, incl. administration building, machine housings, traveling cranes, machinery, dredging channel in front of new pier, concrete bulkhead wall, leveling property, etc., Bronx River, Westchester Ave. and East 172nd St. $50,000.

N. Y., New York—FACTORY—E. H. Fickenger, 11 Gateway Dr., Great Neck, plans by D. and L. Levy, 527 5th Ave., altering 4 and 5 story factory, incl. new boiler and boiler house, 516 West 25th St. $28,000.

N. Y., New York—STORAGE and GARAGE—Anheuser-Busch, Inc., lessee, 515 West 16th St., plans storage and garage, 611 West 33rd St., for New York State Realty & Terminal Co., 466 Lexington Ave., $50,000. Private plans by lessee, and lessee will handle construction.

N. Y., New York—STORAGE and STORE—General Society of Mechanics & Tradesmen, 16 West 44th St., plans by Murgatroyd & Ogden, 285 Madison Ave., heating plant for storage and stores, 30 Crosby St. $28,000.

N. Y., New York—STORAGE and WAREHOUSE—Baltimore & Ohio R.R. Co., H. A. Lane, ch. engr., Baltimore, Md., plans brick, concrete addition, 602 West 26th St. $28,000. A. Rothmann, 19 Rector St., archt.

N. Y., New York—WAGON STORAGE—Borden Farm Products Co., 110 Hudson St., plans by C. A. Pierce, 110 Hudson St., 60x200 ft., brick, 218 West 130th St. $28,000.

N. C., Scotland Neck—COTTON GIN, etc.—E. T. Smith Bros., plans cotton gin and oil press. $28,000. Architect not appointed.

O., Cleveland—DAIRY—Eagle Dairy Co., J. Fisher, pres., 2193 East 40th St., plans 1 and 2 story, brick, steel addition. $40,000. Architect not appointed.

O., Cleveland—SERVICE STATIONS, etc.—Shell Petroleum Co., 50 West 50th St., New York, and Union Trust Bldg., Cleveland, plans group service stations and repair shops, 114th St. and Superior Ave., and other locations. To exceed $30,000. Private plans.

O., Sebring—TUNNEL GLOST KILN—French-Saxon Pottery Co., W. V. Oliver, pres. and treas., plans new tunnel glost kiln at plant. $75,000.

O., Toledo—BUS TERMINAL—Greyhound Lines, 439 Superior St., plans by W. D. Holtzman, Jr., Nicholas Bldg., bus terminal, Superior St. and Jefferson Ave. $55,000.

Ore., Lakeview—PLANT—C. S. Campbell, plans workup plant, box factory, and sawmill on 40 acre site.

Pa., Bradford—PLANTS—Sloan & Zook Companies, 101 Main St., plans installation of air and gas pressure plants for recovery of crude oil from wells at various locations in Warren, Crawford and Venango Counties. H. K. Dougherty, c/o owners, engr.

Pa., Oil City—MILK PLANT—Purity Milk Co., A. F. Washolm, pres., 7 Spring St., plans plant addition on 40x80 ft. site, Spring St., recently acquired. To exceed $28,500. Architect not appointed.

Pa., Schaefferstown—DISTILLERY—Lebanon Valley Distilling Co. plans reconditioning Bomberger Distillery. $40,000. **Maturity soon.**

Pa., Verona—PLANT—American Steel Fdry. Co., Park Bldg., Pittsburgh, and Verona, plans altering plant and purchasing equipment. $500,-000-$1,000,000.

R. I., Providence — SUPER SERVICE STATION—Sun Oil Co., 1608 Walnut St., Phila., Pa., soon takes bids super service station, Westminster and Franklin Sts. Private plans.

Tex., Agua Dulce—PLANT—Texon Royalty Co., Agua Dulce Oil Fields, Nueces Co., plans gasoline and carbon black plant, Agua Dulce Fields, Nueces Co. To exceed $30,000.

Tex., Laredo — FOUNDRY, etc. — Border Fdry. & Machine Co., Mirando City, plans large foundry and machine plant to replace one destroyed by fire. Est. about $75,000.

Tex., Longview — PLANT — Longview Coca Cola Bottling Co., B. F. Martin, in charge, soon lets contract 2 story, plant and equipment, West Tyler St. $28,000 or more.

Tex., Mirando—PLANT—Border Fdry. & Machine Co. plans plant. Est. about $28,000 with equipment. **Maturity indefinite.** Architect not appointed.

Tex., Mission—ICE PLANT—McAllen Ice Co., c/o Hill & Morton, 14 South 11th St., McAllen, soon takes bids 2 story, brick, concrete, rein.-con. ice plant, Hy. 4 and Dunlap Ave. Private plans.

Tex., Uvalde—STORAGE, etc.—J. C. Penney Co., 330 West 34th St., New York, plans storage, department store and distribution. $45,000 or more. Architect not appointed.

Wis., Astico—PLANT—Astico Milk Products Co. plans altering and repairing plant. $28,000 or more.

Wis., Peshtigo—PLANT—Badger Paper Co. soon lets contract plant addition. $50,000 with equipment.

B. C., Stewart—POWER HOUSE—Premier Gold Mine Co., Stewart, plans rebuilding power house, completely destroyed by fire. Loss $200,000. Owners interested immediately in complete new equipment.

Man., Winnipeg—SAW MILLS, etc.—Northern Spruce Mills Ltd., A. M. Campbell, pres., plans saw mills, shingle, lathe sash and saw mills. To exceed $50,000.

N. B., St. Regmond—SAW MILL—J. Valere Landry plans saw mill and lumber plant. $30,-000 or more. **Maturity indefinite.**

Ontario—GOLD MINING DEVELOPMENT—See "Contracts Awarded."

Ont., Bessemer—MILL—W. F. Hamlyn and W. H. Howell, plans saw and shingle mill. $35,-000.

Ont., Clinton—CHICKEN HATCHERY, COLD STORAGE PLANT, etc.—F. W. Andrews Egg Corp., F. W. Andrews, owner, plans chicken hatchery, egg plant, and cold storage building, consisting of four 4 story, 50x600 ft., brick and concrete buildings and install special equipment to care for 60,000 laying hens and 150,-000 broilers. $150,000.

Ont., Galt—MILL—Riverside Silk Mills Ltd. making plans 1 story, 32x86 ft. and 3 story, 29x86 ft. brick, steel silk mill addition, requiring silk spinning machinery.

Ont., Niagara Falls—PLANT—Animal Trap Co. of America, F. Woolworth, mgr., plans 2 story, 80x140 ft. brick or concrete trap plant addition. $45,000.

Ont., Port Credit—REFINERY—Lloyd Refineries, plans refinery addition (Dubbs cracking unit). To exceed $28,000. Universal Oil Products Co., 30 Rockefeller Plaza, New York, and Chicago, Ill., engrs. and archts.

P. E. I., Charlottetown—MILL—Lannigans Woolen Mills Ltd. plans mill. $50,000. **Maturity this year.**

Que., Montreal—GRAIN ELEVATOR—Compagnie des Silos et de Travaux Publics, Sitra Ltee., c/o Chilion G. Heward, K.C., plans grain elevator.

Que., Monfreal—PLANT—International Paint Co., Park Ave., making plans addition. $65,000.

Que., Montreal — PLANT — Atex Insulation Ltd. plans plant for manufacture of insulating material and rock wool.

Que., Valley Junction—FACTORY—A. Cliche plans sash and door factory, $30,000. Will require equipment.

Sask., Buchanan—GRAIN ELEVATOR—Inter Ocean Grain Co. Ltd. plans new grain elevator. $40,000.

BIDS ASKED

La., Bogalusa — PLANT — See "Contracts Awarded."

N. J., Newark—DAIRY and GARAGE—Harrington & Co., 36 Globe St., taking bids dairy and garage. $35,000. L. V. Lacy, c/o owner, archt.

N. Y., Long Island City—BAKING PLANT—Gordon Baking Co., 21st St. and Bridge Plaza, taking bids (selected list contractors) altering baking plant, 21st St. and Bridge Plaza. $60,-000. J. Van Wart, 551 5th Ave., New York, archt. Noted June 7.

Tex., McAllen — ICE PLANT — McAllen Ice Co., c/o Hill & Morton, 14 South 11th St., taking bids 2 story, 75 ton brick, steel, rein.-con., plain found. $45,000. Private plans.

Ont., East Windsor—FOUNDRY—Ford Motor Co. of Canada taking bids 1 and 2 story, rein.-con., brick, steel foundry, plain found., for proposed electric foundry plant, 1st unit of proposed enlargement of Ford plant in Canada. $425,000. Private plans.

CONTRACTS AWARDED

Calif., Escondido—PACKING HOUSE—Escondido Orange Assn., W. L. Carson, mgr., 1 story, 120x300 ft., rein.-con. orange and grapefruit packing house, to Wm. P. Neil Co., 4814 Loma Vista Ave., Los Angeles. Est. $90,000. Noted Sept. 6.

Calif., Stockton—WINERY—Riverbank Canning Co., winery, to J. A. Allen, 22 South Sutter St. Est. $65,000.

Calif., Upland—PACKING PLANT — Upland Lemon Grower's Assn., L. R. Bradley, mgr., 1 story L-shaped 245x318 ft. and 100x111 ft., rein.-con. packing plant, A St. and 4th Ave., day labor and sub-contracts. $100,000. W. W. Ache, 1616 4th Ave., Los Angeles, archt. Noted June 7.

Ky., Athertonville—DISTILLERY—Cummins Distillery Corp., power plant for distillery, to H. Y. Whittenburg, 3313 South 3rd St., Louisville. Owner taking bids for boilers, stoker, etc. Est. $200,000 with equipment. Noted Dec. 21.

Ky., Fordsville—PLANT—T. M. Galey, Fordsville, assembly of gasoline skimming plant, day labor and separate contracts. To exceed $28,000 with equipment.

La., Bogalusa—PLANT—Great Southern Lumber Co. will soon start work for erection of building and installing machinery by company forces for extracting oil from tung nuts. Private plans.

Mass., Dorchester—MARKET—Superior Realty Co., Inc., c/o Mr. P. Cipino, Uphams Corner Market, 2 story, basement, 88x155 ft., brick, stone, structural steel market, concrete found., Gallivan Blvd., to H. L. Hauser Building Co., Inc., 29 Bay St. Est. exceeds $100,000. Noted Oct. 25. Bids Oct. 24, awarded about Oct. 31.

Mass., West Springfield—WAREHOUSE, etc.—Sinclair Refining Co., M. Leonard, supt. constr., 677 Memorial Ave., 1 story, 25x100 ft. warehouse, 2 story, 25x30 ft. office, 1 story, 16x28 ft. pump house, tanks, pumps, etc., Bramble St. To exceed $40,000. Owner builds, work started. Private plans.

N. J., Lyndhurst—FACTORY—J. M. Lehmann Co., New York Ave., general contract factory, to Brown & Mathews Co., 122 East 42nd St., New York. $30,000 or more. Contractor awarded structural steel, to Salbach Meyer Co., c/o contractor. Other sub-contracts awarded.

N. C., High Point—BAKER—American Bakeries Corp., constructing bakery addition, equipment, separate contracts awarded. To exceed $28,000.

O., Cleveland — FACTORY — Hankins Container Co., 3044 West 106th St., 2 story, basement, 58x203 ft., brick, rein.-con., steel addition, plain found., to Gillmore-Carmichael-Olson Co., 1873 East 55th St. Est. $75,000. Awarded Nov. 6. Noted June 28.

O., Norwood—FACTORY—Heekin Can Co., Park St. and Forest Ave., 1 story, brick, rein.-con., plain found., to Ferro Concrete Co., 3rd and Elm Sts., Cincinnati, $40,000. Ferro Concrete Co., 3rd and Elm Sts., Cincinnati, engrs.

O., Toledo—PLANT—E. I. DuPont de Nemours & Co., Wilmington, Del., altering Mountain Varnish & Color Co. plant, Tremainsville Rd., to A. Bentley & Sons, 201 Belmont Ave. Est. $250,000. Noted Nov. 1.

Tex., Texas City—OIL REFINERY—Republic Oil Refinery Co., gasoline recovery plant, separate contracts awarded. To exceed $30,000.

Ontario—GOLD MINING DEVELOPMENT—Red Lake Gold Shore Mines, Ltd., c/o R. H. Templeton, Federal Bldg., Buffalo, N. Y., or c/o A. Lucas, 230 Riverside Dr., New York, gold mining development in undisclosed locations, day labor. To exceed $50,000. Owner now taking bids on equipment.

Ont., Perth—FACTORY—Code Felt & Knitting Co., T. A. Code, genl. mgr., Park Ave., Harvey St., 2 story, 40x75 ft., brick addition, to R. T. Parks, Wilson St.

Ont., Toronto—BAKERY—Ideal Bread Co. Ltd., 183 Davercourt Rd., 1 story, 60x90 ft. addition to stable, also 1 story, 93x135 ft., brick, steel new plant unit, Greenwood and Felstead Aves., to R. G. Kirby & Sons Ltd., 539 Young St. Est. $40,000.

Ont., Toronto — FACTORY — Liquid Carbonic Canadian Corp., Mill and Trinity Sts., electrical work for 73x175 ft. liquid carbonic gas and dry ice manufacturing plant, to E. L. Roxborough Electric Co., 26 Bloor St. W.***heating, to J. G. Jackson, 311 Kenney Ave.***three 80 ft. high steel cooling towers, to Toronto Iron Wks. Ltd., $5,800. Noted Aug. 9.

Ont., Toronto—REFINERY—Swift Canadian Co. Ltd., St. Clair Ave. West at Keele St., general contract 4 story, 50x65 ft., brick, rein.-con. storage and refinery, St. Clair Ave., (Union Stock Yards), to Carter-Halls-Aldinger Co. Ltd., Mills and Cherry Sts., $50,000; structural steel, to Disher Steel Constr. Co. Ltd., 80 Commissioner St. Private plans.

Que., Fond D'Ormes — SAW MILL — Price Bros. & Co. Ltd., constructing sawmill, to O. Vezina, Rimouski, $35,000.

†*Federal Government.*

For official proposal advertising see Searchlight Section

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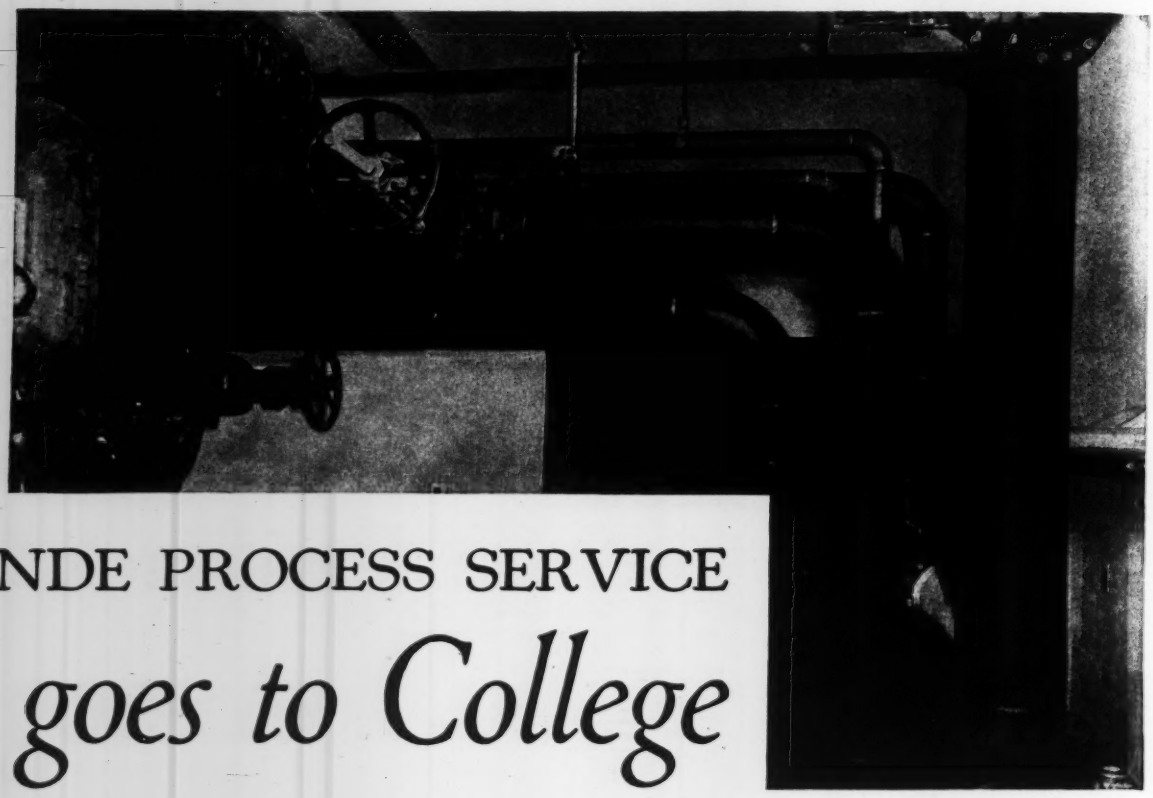

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